

Hertzog

10/688,243

08/17/2004

=> file reg

# STIC SEARCH

FILE 'REGISTRY' ENTERED AT 11:38:40 ON 17 AUG 2004  
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.  
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.  
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Property values tagged with IC are from the ZIC/VINITI data file  
provided by InfoChem.

STRUCTURE FILE UPDATES: 16 AUG 2004 HIGHEST RN 727651-15-2  
DICTIONARY FILE UPDATES: 16 AUG 2004 HIGHEST RN 727651-15-2

TSCA INFORMATION NOW CURRENT THROUGH MAY 21, 2004

Please note that search-term pricing does apply when  
conducting SmartSELECT searches.

Crossover limits have been increased. See HELP CROSSOVER for details.

Experimental and calculated property data are now available. For more  
information enter HELP PROP at an arrow prompt in the file or refer  
to the file summary sheet on the web at:  
<http://www.cas.org/ONLINE/DBSS/registryss.html>

=> d his

(FILE 'HOME' ENTERED AT 09:56:55 ON 17 AUG 2004)

FILE 'HCA' ENTERED AT 09:59:07 ON 17 AUG 2004  
E US20040086443/PN

L1 1 S E3  
SEL L1 RN

FILE 'REGISTRY' ENTERED AT 09:59:40 ON 17 AUG 2004  
L2 10 S E1-E10

FILE 'LCA' ENTERED AT 09:59:48 ON 17 AUG 2004  
L3 2119 S (RETARDER? OR INHIBITOR? OR SUPPRESSOR? OR SCAVENG?)  
L4 1899 S SULFUR# OR SULPHUR# OR (SULFUR# OR SULPHUR#) (N)HYDRIDE## OR H

FILE 'HCA' ENTERED AT 10:04:28 ON 17 AUG 2004  
L5 946220 S L3  
L6 666696 S L4  
L7 3153 S L5(3N)L6

FILE 'LCA' ENTERED AT 10:05:13 ON 17 AUG 2004  
L8 65 S SULPHYDRYL# OR SULPHYDRIL#  
L9 1597 S RECOVER? OR RECLAIM? OR RECLAMAT? OR RE(W) (COVER? OR CLAMAT?  
L10 5286 S LIQUID# OR LIQ# OR MOLTEN# OR FLUID? OR MELTED? OR LIQUIF? OR  
L11 3282 S SUSPEN? OR DISPERS? OR COLLOID? OR EMULS? OR MICROEMULS? OR S

FILE 'HCA' ENTERED AT 10:12:44 ON 17 AUG 2004  
L12 22428 S L8

Hertzog

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L13 20487 S L4(3N) (L10 OR L11)  
L14 85 S L7 AND L12

FILE 'HCA' ENTERED AT 10:14:14 ON 17 AUG 2004

FILE 'REGISTRY' ENTERED AT 10:14:35 ON 17 AUG 2004

L15 6 S L2 AND 1-10/NR  
L16 4 S L2 NOT L15  
L17 2 S L16 AND SULFUR  
L18 1 S L17 AND 1-3/H  
L19 1 S L17 NOT L18  
L20 2 S L16 NOT L17  
L21 1 S L15 AND CYCLOHEXENE  
L22 7 S (L15 OR L20) NOT L21

FILE 'HCA' ENTERED AT 10:17:18 ON 17 AUG 2004

L23 126935 S L19  
L24 7587 S L19/P  
L25 26196 S L22  
L26 47166 S L18

FILE 'LCA' ENTERED AT 10:18:34 ON 17 AUG 2004

FILE 'HCA' ENTERED AT 10:21:26 ON 17 AUG 2004  
L27 16554 S L4(2N) (L10 OR L11)  
L28 3181 S L27 AND (73/SX,SC OR 55/SX,SC OR 53/SX,SC)  
L29 13373 S L27 NOT L28  
L30 568 S L24 AND (L13 OR L7)  
L31 16503 S L29 OR L30 OR L7

FILE 'REGISTRY' ENTERED AT 10:25:48 ON 17 AUG 2004

FILE 'HCA' ENTERED AT 10:25:59 ON 17 AUG 2004  
L32 TRA L31 1-4000 RN : 14182 TERMS

FILE 'REGISTRY' ENTERED AT 10:28:03 ON 17 AUG 2004  
L33 14181 SEA L32

FILE 'HCA' ENTERED AT 10:29:28 ON 17 AUG 2004  
L34 TRA L31 4001-10000 RN : 14825 TERMS

FILE 'REGISTRY' ENTERED AT 10:32:29 ON 17 AUG 2004  
L35 14818 SEA L34

FILE 'HCA' ENTERED AT 10:33:30 ON 17 AUG 2004  
L36 TRA L31 10001-16503 RN : 8822 TERMS

FILE 'REGISTRY' ENTERED AT 10:36:56 ON 17 AUG 2004  
L37 8811 SEA L36  
L38 32443 S L33 OR L35 OR L37

FILE 'LREGISTRY' ENTERED AT 10:44:06 ON 17 AUG 2004  
L39 STR  
L40 STR L39  
L41 STR

FILE 'REGISTRY' ENTERED AT 10:52:00 ON 17 AUG 2004  
L42 50 S L40 OR L41 SSS SAM SUB=L38

L43            7 S L41 SSS SAM SUB=L38

FILE 'LREGISTRY' ENTERED AT 10:53:44 ON 17 AUG 2004

L44            STR L40

L45            STR L44

FILE 'REGISTRY' ENTERED AT 10:58:14 ON 17 AUG 2004

L46            50 S L45 OR L41 SSS SAM SUB=L38

FILE 'LREGISTRY' ENTERED AT 10:59:10 ON 17 AUG 2004

L47            STR L45

L48            STR L45

FILE 'REGISTRY' ENTERED AT 11:01:51 ON 17 AUG 2004

L49            11 S L47 OR L41 SSS SAM SUB=L38

FILE 'LREGISTRY' ENTERED AT 11:02:39 ON 17 AUG 2004

FILE 'REGISTRY' ENTERED AT 11:09:08 ON 17 AUG 2004

L50            50 S L45 OR L41 SSS SAM SUB=L38

L51            4286 S L45 OR L41 SSS FULL SUB=L38  
SAVE L51 HRTZG243/A

L52            11 S L47 OR L41 SSS SAM SUB=L51

L53            257 S L47 OR L41 SSS FULL SUB=L51  
SAVE L51 HRTZG243A/A  
DELETE HRTZG243A/A  
SAVE L53 HRTZG243A/A

L54            4029 S L51 NOT L53

FILE 'HCA' ENTERED AT 11:13:18 ON 17 AUG 2004

L55            207497 S L53

L56            1996977 S L54

L57            53 S L24 AND L55

L58            674 S L24 AND L56

L59            529810 S CARBONATE# OR ANHYDRIDE# OR EPOXIDE# OR POLYANHYDRIDE#

L60            29 S L57 AND L59

L61            2 S L60 AND L13

L62            171 S L58 AND L59

L63            15 S L62 AND L13

L64            2 S L62 AND L12

L65            1 S L57 AND L12

L66            221878 S L4/TI

L67            93 S L62 AND L66

L68            187433 S 49/SX,SC

L69            64 S L62 AND L68

L70            6 S L69 AND L13

L71            1 S L69 AND L12

L72            17 S L69 AND L10

L73            17 S L72 AND L4

L74            QUE PREPARATION?

L75            8 S L61 OR L64 OR L65 OR L70 OR L71

L76            17 S L72 OR L73

L77            27 S L76 OR L63

L78            29 S L77 OR L75

L79            26 S L78 AND 1907-2001/PY,PRY

L80            23 S L79 AND L74

L81            26 S L79 OR L80

L82            26 S L81 AND L59

L83 62 S L69 AND 1907-2000/PY, PRY  
 L84 46 S L83 NOT L82

FILE 'LCA' ENTERED AT 11:26:50 ON 17 AUG 2004  
 L85 6605 S RECOVER? OR WINN? OR PURIF? OR PURE# OR OXIDATION#

FILE 'HCA' ENTERED AT 11:34:29 ON 17 AUG 2004  
 L86 36536 S L6(3N)L85  
 L87 29 S L84 AND L86  
 L88 25 S L78 AND 1907-2000/PY, PRY  
 L89 54 S L88 OR L88 OR L87  
 L90 54 S L89 AND (L55 OR L56)

FILE 'REGISTRY' ENTERED AT 11:38:40 ON 17 AUG 2004

=> d que stat L51

ARDITH,

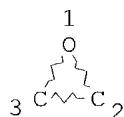
I PERFORMED A TEXT SEARCH FOR MOLTEN SULFUR AND WHERE SULFUR WAS FORMED AS A PRODUCT AND TRANSFERRED THE REGISTRY NUMBERS FROM THE CA RECORDS INTO THE REGISTRY FILE. I THEN DID A STRUCTURE SEARCH OF THE EXPOXIDE, ANHYDRIDE FROM THE REGISTRY NUMBERS THAT WERE TRANSFERRED FROM CHEMICAL ABSTRACTS INTO THE REGISTRY FILE.

*Text Search*

L2 10 SEA FILE=REGISTRY ABB=ON PLU=ON (108-32-7/B1 OR 122-60-1/B1 OR 123-54-6/B1 OR 138-86-3/B1 OR 2461-15-6/B1 OR 25377-73-5/B1 OR 26560-94-1/B1 OR 26761-45-5/B1 OR 7704-34-9/B1 OR 7783-06-4/B1)  
 L4 1899 SEA FILE=LCA ABB=ON PLU=ON SULFUR# OR SULPHUR# OR (SULFUR# OR SULPHUR#) (A)HYDRIDE## OR H2S OR MERCAPTO# OR SULFIDE# OR SULPHIDE#  
 L5 946220 SEA FILE=HCA ABB=ON PLU=ON (RETARDER? OR INHIBITOR? OR SUPPRESSOR? OR SCAVENG?)  
 L6 666696 SEA FILE=HCA ABB=ON PLU=ON SULFUR# OR SULPHUR# OR (SULFUR# OR SULPHUR#) (A)HYDRIDE## OR H2S OR MERCAPTO# OR SULFIDE# OR SULPHIDE#  
 L7 3153 SEA FILE=HCA ABB=ON PLU=ON L5 (3A) L6  
 L10 5286 SEA FILE=LCA ABB=ON PLU=ON LIQUID# OR LIQ# OR MOLTEN# OR FLUID? OR MELTED? OR LIQUIF? OR COLLOIDAL#  
 L11 3282 SEA FILE=LCA ABB=ON PLU=ON SUSPEN? OR DISPERS? OR COLLOID? OR EMULS? OR MICROEMULS? OR SLURR?  
 L13 20487 SEA FILE=HCA ABB=ON PLU=ON L4 (3A) (L10 OR L11)  
 L15 6 SEA FILE=REGISTRY ABB=ON PLU=ON L2 AND 1-10/NR  
 L16 4 SEA FILE=REGISTRY ABB=ON PLU=ON L2 NOT L15  
 L17 2 SEA FILE=REGISTRY ABB=ON PLU=ON L16 AND SULFUR  
 L18 1 SEA FILE=REGISTRY ABB=ON PLU=ON L17 AND 1-3/H  
 L19 1 SEA FILE=REGISTRY ABB=ON PLU=ON L17 NOT L18  
 L24 7587 SEA FILE=HCA ABB=ON PLU=ON L19/P ← Preparation of sulfur.  
 L27 16554 SEA FILE=HCA ABB=ON PLU=ON L4 (2A) (L10 OR L11)  
 L28 3181 SEA FILE=HCA ABB=ON PLU=ON L27 AND (73/SX, SC OR 55/SX, SC OR 53/SX, SC)

searched very broadly

L29 13373 SEA FILE=HCA ABB=ON PLU=ON L27 NOT L28  
 L30 568 SEA FILE=HCA ABB=ON PLU=ON L24 AND (L13 OR L7)  
 L31 16503 SEA FILE=HCA ABB=ON PLU=ON L29 OR L30 OR L7  
 L32 TRANSFER PLU=ON L31 1-4000 RN : 14182 TERMS  
 L33 14181 SEA FILE=REGISTRY ABB=ON PLU=ON L32  
 L34 TRANSFER PLU=ON L31 4001-10000 RN : 14825 TERMS  
 L35 14818 SEA FILE=REGISTRY ABB=ON PLU=ON L34  
 L36 TRANSFER PLU=ON L31 10001-16503 RN : 8822 TERMS  
 L37 8011 SEA FILE=REGISTRY ABB=ON PLU=ON L36  
 L38 32443 SEA FILE=REGISTRY ABB=ON PLU=ON L33 OR L35 OR L37  
 L41 STR



*My search was of these reg #'s.*

CHEMICAL ABSTRACT RECORD FROM WHICH REGISTRY #'S WERE TRANSFERRED INTO REC.

## NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

## GRAPH ATTRIBUTES:

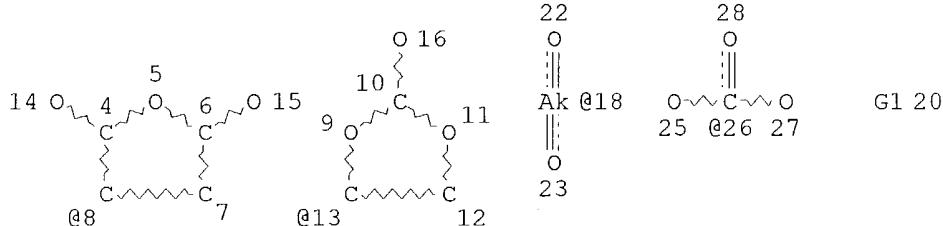
RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 3

*I searched very broadly.*

## STEREO ATTRIBUTES: NONE

L45 STR



VAR G1=8/13/18/26

## NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

## GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 21

## STEREO ATTRIBUTES: NONE

L51 4286 SEA FILE=REGISTRY SUB=L38 SSS FUL L45 OR L41

100.0% PROCESSED 17342 ITERATIONS

4286 ANSWERS

SEARCH TIME: 00.00.02

=&gt; file hca

FILE 'HCA' ENTERED AT 11:39:31 ON 17 AUG 2004  
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.  
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FILE COVERS 1907 - 13 Aug 2004 VOL 141 ISS 8  
FILE LAST UPDATED: 13 Aug 2004 (20040813/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d L90 1-54 ti

L90 ANSWER 1 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Difference detection methods using matched multiple dyes

L90 ANSWER 2 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Hydrogen sulfide abatement in molten sulfur

L90 ANSWER 3 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Process for removing sulfur compounds from hydrocarbon streams

L90 ANSWER 4 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Method for oxidizing hydrogen sulfide to elemental sulfur

L90 ANSWER 5 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Method and composition for removing CO<sub>2</sub> and H<sub>2</sub>S from gas mixtures

L90 ANSWER 6 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Study on removal of hydrogen sulfide from refinery acid gas by chemical absorption-catalytic oxidation in aqueous solution

L90 ANSWER 7 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Recovery of sulfur from treated product gases from gasification of coal or heavy oils

L90 ANSWER 8 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Processing of sulfur-containing materials from flue gas desulfurization or related sources for calcium compound recovery

L90 ANSWER 9 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Process for preparing an agent based on colloidal sulfur

obtained from sulfane for the protection of agricultural plants

L90 ANSWER 10 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI A biological process for the reclamation of flue gas desulfurization gypsum using mixed sulfate-reducing bacteria with inexpensive carbon sources

L90 ANSWER 11 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Manufacture of gypsum from **sulfur** derived from desulfurization of petroleum products

L90 ANSWER 12 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Recycling of FGD gypsum to calcium **carbonate** and elemental sulfur using mixed sulfate-reducing bacteria with sewage digest as a carbon source

L90 ANSWER 13 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Elemental **sulfur recovery** from flue gases.

L90 ANSWER 14 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Combination of a sulfur compound and specific phosphorus compounds and their use in lubricating compositions, concentrates and greases

L90 ANSWER 15 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Processing of residue from coal **fluidized**-bed gasification

L90 ANSWER 16 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Method for recovering sulfur in a wet desulfurization of gases

L90 ANSWER 17 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Recovery of technical **sulfur** from concentrates resulted from flotation of ores containing **sulfur**

L90 ANSWER 18 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Flue Gas Desulfurization Scheme To **Recover** Elemental **Sulfur**

L90 ANSWER 19 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Process for **recovering sulfur** from carbon dioxide- and hydrogen sulfide-containing acid gas mixtures

L90 ANSWER 20 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI **Purification** of **sulfur**

L90 ANSWER 21 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Continuous biological process for the elimination of malodorous **sulfur** compounds present in gas mixtures

L90 ANSWER 22 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Removal and **recovery** of **sulfur** dioxide from waste gases, especially from metallurgical plants, and from flue gases

L90 ANSWER 23 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Petrology of Philippine geothermal systems and the application of alteration mineralogy to their assessment

L90 ANSWER 24 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Manufacture of sublimed amorphous **sulfur**

L90 ANSWER 25 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Soda recovery from metallurgical slags

L90 ANSWER 26 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Production of water-suspendable liquid or solid  
**sulfur** concentrates

L90 ANSWER 27 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI MHD seed recovery and regeneration

L90 ANSWER 28 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Process for removal of hydrogen sulfide from sour gas streams

L90 ANSWER 29 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Method and apparatus for purifying raw gases from coal gasification while  
producing synthesis and fuel gas

L90 ANSWER 30 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Effect of the method of copper oxide addition on chemisorption properties  
of zinc-containing **sulfur-purification** materials

L90 ANSWER 31 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Process for removing hydrogen sulfide from gas streams

L90 ANSWER 32 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Preparation of olefin adduct vulcanizing agents for rubbers

L90 ANSWER 33 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Preparation of elementary **sulfur** from pyrites of any source and  
pyritic concentrates, in dry form at atmospheric pressure

L90 ANSWER 34 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Method for purifying stratal and drainage water of **sulfur** pits

L90 ANSWER 35 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI New gas scrubber removes H<sub>2</sub>S

L90 ANSWER 36 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Method of **winning** of elemental **sulfur** from sulfur ore

L90 ANSWER 37 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI **Winning** of pure **sulfur** from **sulfur**  
ore

L90 ANSWER 38 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI **Sulfur** and calcium **carbonate** from gypsum

L90 ANSWER 39 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Desulfurization by three-stage combustion

L90 ANSWER 40 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Recovery of calcium **carbonate** and sulfur from FGD scrubber waste

L90 ANSWER 41 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Removing hydrogen sulfide from gas streams

L90 ANSWER 42 OF 54 HCA COPYRIGHT 2004 ACS on STN

TI Conversion of alkali metal sulfate to the **carbonate**

L90 ANSWER 43 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Aqueous **carbonate** process design study

L90 ANSWER 44 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI **Recovering** calcium and **sulfur** compounds from a metallurgical waste material

L90 ANSWER 45 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Rare anthropogenic and natural particles suspended in deep ocean waters

L90 ANSWER 46 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Treatment of an alkali metal sulfide solution

L90 ANSWER 47 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Removal of hydrogen sulfide from natural gas to obtain elemental sulfur

L90 ANSWER 48 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Study of reagent conditions for autoclave melting of sulfur

L90 ANSWER 49 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI **Recovery** of **sulfur** dioxide

L90 ANSWER 50 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Chemistry of the **molten carbonate** process for **sulfur** oxides removal stack gases

L90 ANSWER 51 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Treating **liquid** waste containing **sulfur**

L90 ANSWER 52 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI **Sulfur** from Claus-process off-gases

L90 ANSWER 53 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Converting soda slag from a blast furnace to useful products

L90 ANSWER 54 OF 54 HCA COPYRIGHT 2004 ACS on STN  
TI Carbon oxide regenerant for **sulfur** recovery from **molten** salts

=> => d L90 2-7,9,11,13,15-20,22,24,26-28,30-31,33-34,36-54 cbib abs hitind hitstr

L90 ANSWER 2 OF 54 HCA COPYRIGHT 2004 ACS on STN  
136:312044 Hydrogen **sulfide** abatement in **molten** *✓ this case*  
**sulfur**. Schield, John A.; Weers, Jerry J.; Cappel, Weldon S.;  
Roof, Glenn L. (Baker Hughes Incorporated, USA). Eur. Pat. Appl. EP  
1197473 A1 20020417, 15 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK,  
ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO.  
(English). CODEN: EPXXDW. APPLICATION: EP 2001-308773 20011015.  
PRIORITY: US 2000-PV240140 20001013; US 2001-975438 20011009.

AB The present invention provides a method for inhibiting the evolution of H<sub>2</sub>S from **sulphydryl** compds. in **molten** **sulfur** by using scavenging agents such as **anhydrides** and polymers thereof, conjugated ketones, **carbonates**, **epoxides**, monoesters and diesters of unsatd. dicarboxylic acids and polymers of these esters, and the like and mixts. thereof. In one

embodiment, it is preferred that the scavenging agent is in **liquid** form at contact temperature with the **molten sulfur**. In another embodiment, the scavenging agent may be atomized into the vapor space over the **molten sulfur** to contact the **sulfur** with the agent.

IC ICM C01B017-02  
CC 49-1 (Industrial Inorganic Chemicals)  
ST hydrogen **sulfide** abatement **molten sulfur**  
IT Naphthenic acids, uses  
RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
(copper salts, scavenging agent; hydrogen **sulfide** abatement in **molten sulfur**)  
IT Carboxylic acids, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(dicarboxylic, diesters, scavenging agent; hydrogen **sulfide** abatement in **molten sulfur**)  
IT Carboxylic acids, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(esters, scavenging agent; hydrogen **sulfide** abatement in **molten sulfur**)  
IT Mercapto compounds (inorganic)  
RL: MSC (Miscellaneous)  
(hydrogen **sulfide** abatement in **molten sulfur**)  
IT Naphthenic acids, uses  
RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
(iron salts, scavenging agent; hydrogen **sulfide** abatement in **molten sulfur**)  
IT Fatty acids, uses  
RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
(linseed-oil, epoxidized, Me esters, scavenging agent; hydrogen **sulfide** abatement in **molten sulfur**)  
IT Alcohols, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyhydric, scavenging agent; hydrogen **sulfide** abatement in **molten sulfur**)  
IT Anhydrides  
Carbonates, uses  
Epoxides  
Polyanhydrides  
RL: TEM (Technical or engineered material use); USES (Uses)  
(scavenging agent; hydrogen **sulfide** abatement in **molten sulfur**)  
IT Fatty acids, uses  
RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
(soya, epoxidized, Me esters, VikoFlex 7010, scavenging agent; hydrogen **sulfide** abatement in **molten sulfur**)  
IT Ketones, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(unsatd., conjugated, scavenging agent; hydrogen **sulfide** abatement in **molten sulfur**)  
IT Naphthenic acids, uses  
RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)

(zinc salts, scavenging agent; hydrogen **sulfide** abatement in  
**molten sulfur**)

IT 26761-45-5  
 RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
 (**Epoxide** 248, scavenging agent; hydrogen **sulfide** abatement in **molten sulfur**)

IT 122-60-1, Heloxy 63  
 RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
 (Heloxy 63, scavenging agent; hydrogen **sulfide** abatement in  
**molten sulfur**)

IT 7704-34-9P, Sulfur, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (hydrogen **sulfide** abatement in **molten sulfur**)

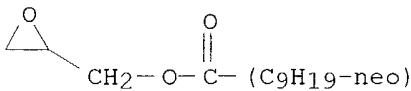
IT 7783-06-4, Hydrogen **sulfide**, processes  
 RL: REM (Removal or disposal); PROC (Process)  
 (hydrogen **sulfide** abatement in **molten sulfur**)

IT 108-32-7, Propylene carbonate 123-54-6,  
 2,4-Pentanedione, uses 138-86-3, Dipentene 2461-15-6,  
 2-Ethylhexylglycidyl ether 25377-73-5, Dodecenylsuccinic  
 anhydride 26560-94-1  
 RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
 (scavenging agent; hydrogen **sulfide** abatement in  
**molten sulfur**)

IT 26761-45-5  
 RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
 (**Epoxide** 248, scavenging agent; hydrogen **sulfide** abatement in  
**molten sulfur**)

RN 26761-45-5 HCA

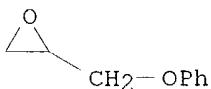
CN Neodecanoic acid, oxiranylmethyl ester (9CI) (CA INDEX NAME)



IT 122-60-1, Heloxy 63  
 RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
 (Heloxy 63, scavenging agent; hydrogen **sulfide** abatement in  
**molten sulfur**)

RN 122-60-1 HCA

CN Oxirane, (phenoxyethyl)- (9CI) (CA INDEX NAME)



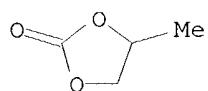
IT 7704-34-9P, Sulfur, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (hydrogen **sulfide** abatement in **molten sulfur**)

RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

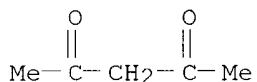
S

IT 108-32-7, Propylene carbonate 123-54-6,  
 2,4-Pentanedione, uses 2461-15-6, 2-Ethylhexylglycidyl ether  
 25377-73-5, Dodecenyldsuccinic anhydride  
 26560-94-1  
 RL: MOA (Modifier or additive use); TEM (Technical or engineered material  
 use); USES (Uses)  
 (scavenging agent; hydrogen sulfide abatement in  
 molten sulfur)

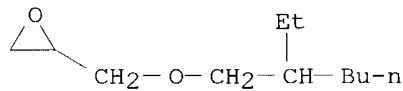
RN 108-32-7 HCA  
 CN 1,3-Dioxolan-2-one, 4-methyl- (9CI) (CA INDEX NAME)



RN 123-54-6 HCA  
 CN 2,4-Pentanedione (8CI, 9CI) (CA INDEX NAME)



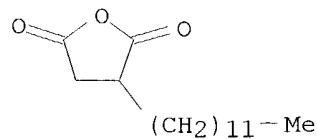
RN 2461-15-6 HCA  
 CN Oxirane, [(2-ethylhexyl)oxy]methyl- (9CI) (CA INDEX NAME)



RN 25377-73-5 HCA  
 CN 2,5-Furandione, 3-(dodecenyl)dihydro- (9CI) (CA INDEX NAME)

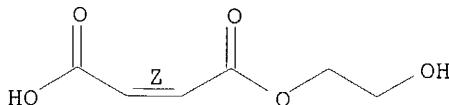
CM 1

CRN 2561-85-5  
 CMF C16 H28 O3



RN 26560-94-1 HCA  
 CN 2-Butenedioic acid (2Z)-, mono(2-hydroxyethyl) ester (9CI) (CA INDEX  
 NAME)

Double bond geometry as shown.



L90 ANSWER 3 OF 54 HCA COPYRIGHT 2004 ACS on STN

135:305979 Process for removing sulfur compounds from hydrocarbon streams.

Pittman, Rusty; Arena, Blaise J.; Janssen, Albert J. (UOP LLC, USA). U.S. ✓ US 6306288 B1 20011023, 6 pp., Cont.-in-part of U.S. Ser. No. 61,661, abandoned. (English). CODEN: USXXAM. APPLICATION: US 1999-426818 19991022. PRIORITY: US 1998-61661 19980417.

AB A process for removing H<sub>2</sub>S and mercaptans from a hydrocarbon stream is disclosed. A hydrocarbon stream such as a LPG stream is contacted with a weakly basic stream, e.g., a Na bicarbonate stream to extract the H<sub>2</sub>S and mercaptans from the hydrocarbon stream into the basic stream. The basic stream is now treated in a reactor containing a sulfide-oxidizing microorganism to convert the H<sub>2</sub>S to S and the mercaptans to disulfides. Finally, the S and disulfides are separated from the basic aqueous stream which can be recycled and used to treat a fresh hydrocarbon stream. The treated hydrocarbon stream is purified to the point that it passes the Cu strip test, while the purified basic stream contains <0.08 g S/L.

IC ICM C10G019-08

ICS C10G019-00; C10G032-00

NCL 208235000

CC 51-4 (Fossil Fuels, Derivatives, and Related Products)

Section cross-reference(s): 49

IT Disulfides

RL: PUR (Purification or recovery); PREP (Preparation)  
(recovery in removing of **sulfur** compds. from  
hydrocarbon streams)

IT 144-55-8, Sodium bicarbonate, uses 497-19-8, Sodium  
carbonate, uses 1336-21-6, Ammonium hydroxide

RL: TEM (Technical or engineered material use); USES (Uses)  
(in removing of sulfur compds. from hydrocarbon streams)

IT 7704-34-9P, Sulfur, preparation

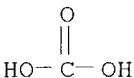
RL: PUR (Purification or recovery); PREP (Preparation)  
(recovery in removing of **sulfur** compds. from  
hydrocarbon streams)

IT 144-55-8, Sodium bicarbonate, uses 497-19-8, Sodium  
carbonate, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
(in removing of sulfur compds. from hydrocarbon streams)

RN 144-55-8 HCA

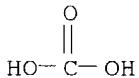
CN Carbonic acid monosodium salt (8CI, 9CI) (CA INDEX NAME)



● Na

RN 497-19-8 HCA

CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



●2 Na

IT 7704-34-9P, **Sulfur**, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (recovery in removing of **sulfur** compds. from  
 hydrocarbon streams)

RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 4 OF 54 HCA COPYRIGHT 2004 ACS on STN

135:290881 Method for oxidizing hydrogen sulfide to elemental sulfur. Li,  
 Kuo-tseng; Chi, Ren-hai (National Science Council, Taiwan). U.S. US  
 6299851 B1 20011009, 7 pp., Cont.-in-part of U.S. Ser. No. 277,301.  
 (English). CODEN: USXXAM. APPLICATION: US 1999-334851 19990617.

PRIORITY: US 1999-277301 19990326.

AB A method for selectively oxidizing hydrogen sulfide to elemental sulfur is disclosed. The method is performed at 50° to 400° and at a pressure ranged from 0.1 to 50 atmospheric. The elemental **sulfur** can be effectively **recovered** from a gas mixture containing hydrogen sulfide in the presence of a catalyst. The catalyst includes a vanadium-containing material and a catalytic substance selected from the group consisting of scandium (Sc), yttrium (Y), lanthanum (La), samarium (Sm) and compds. thereof. In another embodiment, this catalyst further includes an antimony-containing promoter (antimony compds.) which further exhibit a more effective catalytic performance.

IC ICM C01B017-04

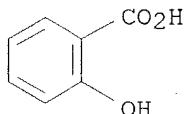
NCL 423573100

CC 49-10 (Industrial Inorganic Chemicals)

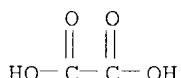
ST **sulfur** manuf hydrogen **sulfide** oxidn catalyst

IT 69-72-7D, Salicylic acid, vanadium complexes 1314-23-4,  
 Zirconia, uses 1327-33-9, Antimony oxide 1344-28-1, Alumina, uses  
 6218-52-6, Vanadium formate 7439-91-0, Lanthanum, uses 7440-19-9,  
 Samarium, uses 7440-20-2, Scandium, uses 7440-36-0, Antimony, uses  
 7440-45-1, Cerium, uses 7440-62-2, Vanadium, uses 7440-65-5, Yttrium,  
 uses 7631-86-9, Silica, uses 11099-11-9, Vanadium oxide 11115-67-6,  
 Ammonium vanadate 11130-24-8, Vanadium sulfide 12070-10-9, Vanadium  
 carbide 12627-52-0, Antimony sulfide 12674-04-3, Vanadium nitride  
 12713-06-3, Vanadium hydride 13463-67-7, Titania, uses 14542-94-0,  
 Vanadium phosphate 14974-48-2, Vanadium oxalate 16785-81-2,  
 Vanadium sulfate 20644-87-5, Vanadium carbonyl 24492-29-3, Vanadium  
 oleate 37353-31-4, Vanadate 39318-26-8, Chromium vanadium oxide  
 39349-74-1, Antimonate 51891-70-4, Vanadium **carbonate**  
 57348-87-5, Vanadium phosphide 63465-09-8, Vanadium acetate  
 67422-42-8, Antimony carbide 77414-04-1 102857-58-9, Vanadium  
 hydroxide 123782-01-4 132036-01-2 152761-81-4, Antimony hydroxide

259744-19-9 364427-27-0  
 RL: CAT (Catalyst use); USES (Uses)  
 (method for oxidizing hydrogen sulfide to elemental sulfur)  
 IT 7704-34-9P, Sulfur, preparation  
 RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)  
 (method for oxidizing hydrogen sulfide to elemental sulfur)  
 IT 69-72-7D, Salicylic acid, vanadium complexes 14974-48-2,  
 Vanadium oxalate  
 RL: CAT (Catalyst use); USES (Uses)  
 (method for oxidizing hydrogen sulfide to elemental sulfur)  
 RN 69-72-7 HCA  
 CN Benzoic acid, 2-hydroxy- (9CI) (CA INDEX NAME)



RN 14974-48-2 HCA  
 CN Ethanedioic acid, vanadium salt (9CI) (CA INDEX NAME)



●x V(x)

IT 7704-34-9P, Sulfur, preparation  
 RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)  
 (method for oxidizing hydrogen sulfide to elemental sulfur)  
 RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

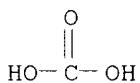
S

L90 ANSWER 5 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 134:254262 Method and composition for removing CO<sub>2</sub> and H<sub>2</sub>S from gas mixtures. Chao, I-Meen (Eickmeyer & Associates, USA). PCT Int. Appl. WO 2001019496 A1 20010322, 24 pp. DESIGNATED STATES: W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 2000-US25397 20000915. PRIORITY: US 1999-PV154009 19990915.

AB Process is disclosed for removal of CO<sub>2</sub> and H<sub>2</sub>S from a sour gas mixture (e.g., natural gas, Fe ore reduction gas). The process uses a continuous absorption process with an alkaline aqueous liquid mixture containing

15-40 weight% of equivalent K<sub>2</sub>CO<sub>3</sub> and is conducted at 150-300°F. The H<sub>2</sub>S is removed from the sour gas as elementary S. CO<sub>2</sub> is stripped from the aqueous alkaline solution and vented directly into the atmospheric since the S that usually contaminates the CO<sub>2</sub> was removed earlier in the process as elementary S.

IC ICM B01D053-14  
ICS B01D053-52  
CC 48-1 (Unit Operations and Processes)  
Section cross-reference(s): 49, 51  
ST carbon dioxide removal gas mixt absorption; hydrogen sulfide removal gas mixt absorption; natural gas sweetening absorption  
IT Absorption  
(for removal of carbon dioxide and hydrogen sulfide from gas mixts.)  
IT Natural gas, processes  
RL: PEP (Physical, engineering or chemical process); PUR (Purification or recovery); PREP (Preparation); PROC (Process)  
(removal of carbon dioxide and hydrogen sulfide from gas mixts. by absorption)  
IT 584-08-7, Potassium carbonate 1314-62-1, Vanadium oxide (V2O5), uses 10043-35-3, Boric acid (H<sub>3</sub>BO<sub>3</sub>), uses RL: TEM (Technical or engineered material use); USES (Uses)  
(in absorption solution for removal of carbon dioxide and hydrogen sulfide from gas mixts.)  
IT 7704-34-9P, Sulfur, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(recovery in removal of carbon dioxide and hydrogen sulfide from gas mixts. by absorption)  
IT 124-38-9, Carbon dioxide, processes 7783-06-4, Hydrogen sulfide, processes  
RL: REM (Removal or disposal); PROC (Process)  
(removal from gas mixture by absorption)  
IT 584-08-7, Potassium carbonate  
RL: TEM (Technical or engineered material use); USES (Uses)  
(in absorption solution for removal of carbon dioxide and hydrogen sulfide from gas mixts.)  
RN 584-08-7 HCA  
CN Carbonic acid, dipotassium salt (8CI, 9CI) (CA INDEX NAME)

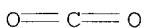


●2 K

IT 7704-34-9P, Sulfur, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(recovery in removal of carbon dioxide and hydrogen sulfide from gas mixts. by absorption)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **124-38-9**, Carbon dioxide, processes  
RL: REM (Removal or disposal); PROC (Process)  
(removal from gas mixture by absorption)  
RN 124-38-9 HCA  
CN Carbon dioxide (8CI, 9CI) (CA INDEX NAME)



L90 ANSWER 6 OF 54 HCA COPYRIGHT 2004 ACS on STN

133:270762 Study on removal of hydrogen **sulfide** from refinery acid gas by chemical absorption-catalytic oxidation in aqueous solution. Dong, Qun; Wu, Xianchun; Shan, Xilin; Wu, Guanjing; Zhang, Jianguo (Daqing Petroleum Institute, Anda, 151400, Peop. Rep. China). Shiyou Lianzhi Yu Huagong, 31(9), 17-19 (Chinese) 2000. CODEN: SLYHEE. ISSN: 1005-2399. Publisher: Shiyou Lianzhi Yu Huagong Zazhishe.

AB A process for removal of hydrogen **sulfide** from refinery acid gas by wet chemical absorption/catalytic oxidation in a basic solution containing catalyst

was conducted in the laboratory. The effects of flow rate ratio of gas/**liquid** in the absorber, the flow rate of air and the residence time of the basic solution in the regeneration tower on the performance of hydrogen **sulfide** removal from refinery acid gas and elemental S recovery were studied. The test result showed that the said process is expected to be used in refineries for acid gas treatment.

CC 59-4 (Air Pollution and Industrial Hygiene)

Section cross-reference(s): 49, 51, 60

ST hydrogen **sulfide** removal refinery acid gas absorption catalytic oxidn; petroleum refinery acid gas wet absorption oxidn **sulfur** recovery

IT Petroleum products

(refinery gases, acid; hydrogen **sulfide** removal from refinery acid gas by wet chemical absorption-catalytic oxidation and **sulfur** recovery)

IT **497-19-8**, Sodium **carbonate**, processes

RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
(absorption by; hydrogen **sulfide** removal from refinery acid gas by wet chemical absorption-catalytic oxidation and **sulfur** recovery)

IT 7772-98-7P, Sodium thiosulfate

RL: BYP (Byproduct); PREP (Preparation)  
(hydrogen **sulfide** removal from refinery acid gas by wet chemical absorption-catalytic oxidation and **sulfur** recovery)

IT **7704-34-9P**, **Sulfur**, preparation

RL: PUR (Purification or recovery); PREP (Preparation)  
(hydrogen **sulfide** removal from refinery acid gas by wet chemical absorption-catalytic oxidation and **sulfur** recovery)

IT 7783-06-4, Hydrogen **sulfide**, processes

RL: REM (Removal or disposal); PROC (Process)  
(hydrogen **sulfide** removal from refinery acid gas by wet chemical absorption-catalytic oxidation and **sulfur** recovery)

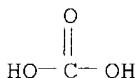
IT **497-19-8**, Sodium **carbonate**, processes

RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
(absorption by; hydrogen **sulfide** removal from refinery acid

gas by wet chemical absorption-catalytic oxidation and **sulfur** recovery)

RN 497-19-8 HCA

CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



●2 Na

IT 7704-34-9P, **Sulfur**, preparation

RL: PUR (Purification or recovery); PREP (Preparation)  
(hydrogen **sulfide** removal from refinery acid gas by wet chemical absorption-catalytic oxidation and **sulfur** recovery)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 7 OF 54 HCA COPYRIGHT 2004 ACS on STN

132:37943 Recovery of **sulfur** from treated product gases from gasification of coal or heavy oils. Yoshida, Kunikatsu; Yamada, Michio; Ueda, Akio; Ueda, Toshiyuki (Babcock-Hitachi K. K., Japan). Jpn. Kokai Tokkyo Koho JP 11347348 A2 19991221 Heisei, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-154006 19980603.

AB Raw product gases containing H<sub>2</sub>S from gasification of coal or heavy oils are treated by wet scrubbing with water to sep. dust, oxidation of the treated gases to convert H<sub>2</sub>S into SO<sub>2</sub>, contacting the gases with an alkali slurry containing CaCO<sub>3</sub>, and further oxidation with divalent metal ions (especially, Fe<sup>2+</sup> or

Co<sup>2+</sup>) to convert sulfites into gypsum, and then recovering elemental S (as gypsum) from the oxidized slurry. In one embodiment, the waste waters containing divalent metal ions (especially, Fe<sup>2+</sup> or Co<sup>2+</sup>) from dust during wet scrubbing can be utilized for increasing the oxidation of CaSO<sub>3</sub> into gypsum.

IC ICM B01D053-50

ICS B01D053-77

CC 51-20 (Fossil Fuels, Derivatives, and Related Products)

Section cross-reference(s): 49

ST **sulfur** recovery raw product coal gasification; gypsum coal gasification raw product desulfurization

IT Limestone, uses

RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(alkali scrubbing solution containing; **recovery of sulfur**  
from treated product gases from gasification of coal or heavy oils)

IT Fuel oil

(heavy; **recovery of sulfur** from treated product  
gases from gasification of coal or heavy oils)

IT Coal gasification

(**recovery of sulfur** from treated product gases from  
gasification of coal or heavy oils)

IT 471-34-1, Calcium **carbonate**, uses

IT      RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
       (alkali scrubbing solution containing; **recovery of sulfur**  
       from treated product gases from gasification of coal or heavy oils)

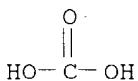
IT      15438-31-0, Iron ion (Fe<sup>2+</sup>), uses 22541-53-3, Cobalt ion (Co<sup>2+</sup>), uses  
       RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
       (**oxidation by; recovery of sulfur** from  
       treated product gases from gasification of coal or heavy oils)

IT      7704-34-9P, **Sulfur**, preparation 13397-24-5P, Gypsum,  
       preparation  
       RL: BYP (Byproduct); PREP (Preparation)  
       (**recovery of sulfur** from treated product gases from  
       gasification of coal or heavy oils)

IT      471-34-1, Calcium **carbonate**, uses  
       RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
       (alkali scrubbing solution containing; **recovery of sulfur**  
       from treated product gases from gasification of coal or heavy oils)

RN      471-34-1 HCA

CN      Carbonic acid calcium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Ca

IT      7704-34-9P, **Sulfur**, preparation  
       RL: BYP (Byproduct); PREP (Preparation)  
       (**recovery of sulfur** from treated product gases from  
       gasification of coal or heavy oils)

RN      7704-34-9 HCA

CN      Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 9 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 128:85437 Process for preparing an agent based on **colloidal**  
**sulfur** obtained from sulfane for the protection of agricultural  
 plants. Koran, Jiri; Bouska, Petr; Buryan, Petr; Konas, Jiri; Kratochvil,  
 Jiri; Pospisil, Jaroslav; Zacher, Jan (Spolana, Czech Rep.). Czech Rep.  
 CZ 282157 B6 19970514, 4 pp. (Czech). CODEN: CZXXED.

AB      A new process for the preparation of **colloid sulfur**  
 fungicides is described. The process eliminates costly energy- and  
 machinery-demanding milling, mixing, and drying associated with uneven sulfur  
 particle size distribution. The process involves formation of a  
 suspension from gaseous sulfan and aqueous solns. of iron complexes. Sulfan  
 (4-6 g/m<sup>3</sup>) is oxidized to sulfur by the complex formed from FeSO<sub>4</sub>.7H<sub>2</sub>O, Na  
 EDTA, H<sub>2</sub>SO<sub>4</sub>, and Na<sub>2</sub>CO<sub>3</sub>. The sulfur particle size distribution is usually  
 sufficient without further operations. If needed, the resulting mix is  
 milled, sieved (sieve pore size 0.18 x 0.1 mm), and dried in a spray dryer

at 110-140°C. The residues of iron complex solution remaining in the **colloid sulfur** preparation do not need to be removed as they are harmless in the soil/plant environment and may even contribute some nutrients. The suspension containing 40-99.5 mass% sulfur is mixed with 1-55 mass% of a surfactant, 0.1-8 mass% NH<sub>4</sub>HCO<sub>3</sub>, and 1-20 mass% of aqueous ammonia (concentration 1-25%). The **colloid sulfur** can be mixed with sulfite solution (surfactant) and ground sulfur (with 3.9% mineral oil) in the preparation of final product. The process can efficiently utilize sulfur byproducts from gas desulfurization.

IC A01N059-02; A01N025-04; C01B017-10

CC 5-1 (Agrochemical Bioregulators)

ST **colloid sulfur** prepn sulfan iron complex; fungicide

**colloid sulfur** prepn sulfan iron

IT Fungicides

(**colloidal sulfur** preparation from sulfane for the protection of agricultural plants)

IT 7704-34-9P, **Sulfur**, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)  
(**colloidal sulfur** preparation from sulfane and iron complex for fungicide production)

IT 139-33-3 497-19-8, Sodium **carbonate**, reactions

1066-33-7, Ammonium bicarbonate 7439-89-6D, Iron, complexes, reactions 7664-41-7, Ammonia, reactions 7664-93-9, Sulfuric acid, reactions 7782-63-0, Ferrous sulfate heptahydrate 14265-45-3, Sulfite 37331-50-3, Sulfane

RL: RCT (Reactant); RACT (Reactant or reagent)

(**colloidal sulfur** preparation from sulfane for the protection of agricultural plants)

IT 7704-34-9P, **Sulfur**, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)  
(**colloidal sulfur** preparation from sulfane and iron complex for fungicide production)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 139-33-3 497-19-8, Sodium **carbonate**, reactions

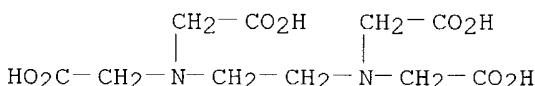
1066-33-7, Ammonium bicarbonate

RL: RCT (Reactant); RACT (Reactant or reagent)

(**colloidal sulfur** preparation from sulfane for the protection of agricultural plants)

RN 139-33-3 HCA

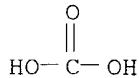
CN Glycine, N,N'-1,2-ethanediylbis[N-(carboxymethyl)-, disodium salt (9CI) (CA INDEX NAME)



●2 Na

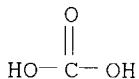
RN 497-19-8 HCA

CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



## ● 2 Na

RN 1066-33-7 HCA  
 CN Carbonic acid, monoammonium salt (8CI, 9CI) (CA INDEX NAME)

● NH<sub>3</sub>

L90 ANSWER 11 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 126:33989 Manufacture of gypsum from **sulfur** derived from desulfurization of petroleum products. Shiozawa, Suguru (Kowa Co, Japan). Jpn. Kokai Tokkyo Koho JP 08283018 A2 19961029 Heisei, 3 pp.

(Japanese). CODEN: JKXXAF. APPLICATION: JP 1995-110234 19950412.

AB The process comprises burning **molten S** formed in the desulfurization to give SO<sub>2</sub>, burning the SO<sub>2</sub> with catalysts to give SO<sub>3</sub>, converting the SO<sub>3</sub> to H<sub>2</sub>SO<sub>4</sub> by absorption with H<sub>2</sub>SO<sub>4</sub>, treating the H<sub>2</sub>SO<sub>4</sub> with a CaCO<sub>3</sub> slurry to give a CaSO<sub>4</sub> slurry, and dewatering the slurry. The byproduct S is utilized, and the gypsum obtained is suitable for cement or gypsum boards.

IC ICM C01F011-46

CC 49-5 (Industrial Inorganic Chemicals)

Section cross-reference(s): 51, 58

ST gypsum manuf petroleum desulfurization **sulfur** recycling; calcium sulfate manuf petroleum desulfurization **sulfur**

IT Petroleum refining

(desulfurization; gypsum manufacture from **sulfur** derived from desulfurization of petroleum products)

IT Recycling

(gypsum manufacture from **sulfur** derived from desulfurization of petroleum products)

IT 7704-34-9P, **Sulfur**, preparation

RL: BYP (Byproduct); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(gypsum manufacture from **sulfur** derived from desulfurization of petroleum products)

IT 7778-18-9P, Calcium sulfate

RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)

(gypsum manufacture from **sulfur** derived from desulfurization of petroleum products)

IT 7446-09-5P, **Sulfur** dioxide, preparation 7446-11-9P,

**Sulfur** trioxide, preparation 7664-93-9P, Sulfuric acid, preparation

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (gypsum manufacture from **sulfur** derived from desulfurization of petroleum products)

IT 13397-24-5P, Gypsum, preparation  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (gypsum manufacture from **sulfur** derived from desulfurization of petroleum products)

IT 471-34-1, Calcium **carbonate**, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (gypsum manufacture from **sulfur** derived from desulfurization of petroleum products)

IT 7704-34-9P, **Sulfur**, preparation  
 RL: BYP (Byproduct); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (gypsum manufacture from **sulfur** derived from desulfurization of petroleum products)

RN 7704-34-9 HCA

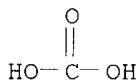
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 471-34-1, Calcium **carbonate**, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (gypsum manufacture from **sulfur** derived from desulfurization of petroleum products)

RN 471-34-1 HCA

CN Carbonic acid calcium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Ca

L90 ANSWER 13 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 124:236405 Elemental **sulfur recovery** from flue gases..  
 Kerti, Jozsef; Kerti, Zsolt (Hung.). Hung. Teljes HU 70675 A2  
**19951030**, 9 pp. (Hungarian). CODEN: HUXXBU. APPLICATION: HU  
 1992-9203160 19921006.

AB Flue gases from thermal power stations, containing SO<sub>2</sub>, are contacted with CaS, CaCO<sub>3</sub>, Na<sub>2</sub>S, or/and Na<sub>2</sub>CO<sub>3</sub> deposited on a porous support at 300-1000° in a reactor. The resulting sulfites are reduced with C, CO, H, and/or natural gas and the elemental S reaction product is condensed in a sept. chamber.

IC ICM B01D053-34

CC 49-2 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 59

ST **sulfur recovery** flue gas

IT Flue gases  
 Recycling  
 (recovery from thermal power station flue gases, containing SO<sub>2</sub>, by

treating with sulfides and/or **carbonates** and reducing)

IT Natural gas  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (recovery from thermal power station flue gases, containing SO<sub>2</sub>, by  
 treating with sulfides and/or **carbonates** and reducing)

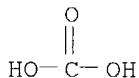
IT 471-34-1, Calcium **carbonate**, uses 497-19-8,  
 Disodium **carbonate**, uses 630-08-0, Carbon monoxide, uses  
 1313-82-2, Sodium **sulfide**, uses 1333-74-0, Hydrogen, uses  
 7440-44-0, Carbon, uses 20548-54-3, Calcium **sulfide**  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (recovery from thermal power station flue gases, containing SO<sub>2</sub>,  
 by treating with sulfides and/or **carbonates** and reducing)

IT 7446-09-5, **Sulfur** dioxide, processes  
 RL: PEP (Physical, engineering or chemical process); PROC (Process)  
 (recovery from thermal power station flue gases, containing SO<sub>2</sub>,  
 by treating with sulfides and/or **carbonates** and reducing)

IT 7704-34-9P, **Sulfur**, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (recovery from thermal power station flue gases, containing SO<sub>2</sub>,  
 by treating with sulfides and/or **carbonates** and reducing)

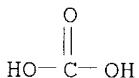
IT 471-34-1, Calcium **carbonate**, uses 497-19-8,  
 Disodium **carbonate**, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (recovery from thermal power station flue gases, containing SO<sub>2</sub>,  
 by treating with sulfides and/or **carbonates** and reducing)

RN 471-34-1 HCA  
 CN Carbonic acid calcium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Ca

RN 497-19-8 HCA  
 CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



●2 Na

IT 7704-34-9P, **Sulfur**, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (recovery from thermal power station flue gases, containing SO<sub>2</sub>,  
 by treating with sulfides and/or **carbonates** and reducing)

RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 15 OF 54 HCA COPYRIGHT 2004 ACS on STN  
123:321351 Processing of residue from coal **fluidized**-bed  
gasification. Herbert, Peter; Reimert, Rainer; Stroeder, Michael  
(Metallgesellschaft AG, Germany). Ger. Offen. DE 4410598 A1  
**19950928**, 6 pp. (German). CODEN: GWXXBX. APPLICATION: DE  
1994-4410598 19940326.

AB A residue (containing coke 8-80, alkaline earth metal **sulfide** (e.g., CaS) 2-45, unreacted alkaline earth metal oxide (e.g., CaO) 1-25 weight%, and ash balance) from **fluidized**-bed gasification of S-rich coal at 700-1100° in the presence of an alkaline earth metal **carbonate** or alkaline earth metal oxide for (partial) desulfurization is withdrawn from the reactor, optionally milled, and mixed with an acid-containing aqueous solution (e.g., CO<sub>2</sub>, H<sub>2</sub>SO<sub>4</sub>). After removal of liberated **H<sub>2</sub>S** (which is used for S manufacture), the residue containing ash, coke, and alkaline earth metal salt (e.g., CaCO<sub>3</sub>, CaSO<sub>4</sub>) is optionally milled and charged into a flotation zone to sep. coke (which is recycled to gasification) and the remaining residue containing ash and alkaline earth metal salt. The residue is dewatered in filter presses, rinsed, filtered again, and disposed.

IC ICM B01D053-34

CC 60-5 (Waste Treatment and Disposal)  
Section cross-reference(s): **49**, 51

ST coal gasification residue processing; coke recycling gasification residue; **sulfur** manuf gasification residue

IT Coal gasification  
(**fluidized**-bed, processing of residue from)

IT **124-38-9**, Carbon dioxide, reactions 7664-93-9, Sulfuric acid, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(in removal of alkaline earth metal **sulfides** from coal gasification residue)

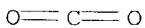
IT **7704-34-9P**, **Sulfur**, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manufacture of **sulfur** from hydrogen **sulfide** liberated during coal gasification residue processing)

IT **471-34-1**, Calcium **carbonate** (CaCO<sub>3</sub>), uses 7778-18-9, Calcium sulfate (CaSO<sub>4</sub>)  
RL: NUU (Other use, unclassified); USES (Uses)  
(processing and disposal of coal gasification residue containing)

IT **124-38-9**, Carbon dioxide, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(in removal of alkaline earth metal **sulfides** from coal gasification residue)

RN 124-38-9 HCA

CN Carbon dioxide (8CI, 9CI) (CA INDEX NAME)



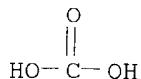
IT **7704-34-9P**, **Sulfur**, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manufacture of **sulfur** from hydrogen **sulfide** liberated during coal gasification residue processing)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **471-34-1**, Calcium **carbonate** (CaCO<sub>3</sub>), uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (processing and disposal of coal gasification residue containing)  
 RN 471-34-1 HCA  
 CN Carbonic acid calcium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Ca

L90 ANSWER 16 OF 54 HCA COPYRIGHT 2004 ACS on STN.  
 123:117472 Method for recovering sulfur in a wet desulfurization of gases.  
 Kowalik, Waldemar; Demusiak, Grzegorz (Instytut Gornictwa Naftowego i  
 Gazownictwa, Pol.). Pol. PL 163962 B1 **19940531**, 4 pp.  
 (Polish). CODEN: POXXA7. APPLICATION: PL 1990-287799 19901115.

AB The process includes absorbing sulfur contaminants in a solution containing hydroquinone and sodium **carbonate**, regenerating the absorption solution by aeration, sedimentation of a sepd.sulfur foam, and filtering unpurified **sulfur suspension**, followed by repulping **sulfur paste**, washing, and filtering the resulting purified **sulfur suspension**, from which flotation **sulfur** is obtained. The absorption is performed at a hydroquinone concentration of 0.4-2.0 g/L, preferably 0.6-1.2 g/L, the regeneration is done at an air volume flow rate/absorption solution flow rate of (2-10):1, preferably (3-7):1, and the filtration of unpurified and purified **sulfur suspensions** is performed at 288-340 K.

IC ICM C01B017-05  
 ICS B01D053-14

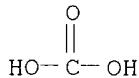
CC **49-1** (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 51

IT 123-31-9, Hydroquinone, uses **497-19-8**, Sodium **carbonate**, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (absorption solution component; in recovery of sulfur in wet desulfurization of gases)

IT **7704-34-9P**, Sulfur, preparation  
 RL: BYP (Byproduct); PUR (Purification or recovery); PREP (Preparation)  
 (method for recovering sulfur in wet desulfurization of gases)

IT **497-19-8**, Sodium **carbonate**, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (absorption solution component; in recovery of sulfur in wet desulfurization of gases)

RN 497-19-8 HCA  
 CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



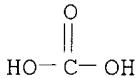
## ●2 Na

IT   **7704-34-9P**, Sulfur, preparation  
 RL: BYP (Byproduct); PUR (Purification or recovery); PREP (Preparation)  
      (method for recovering sulfur in wet desulfurization of gases)  
 RN   7704-34-9   HCA  
 CN   Sulfur (8CI, 9CI)   (CA INDEX NAME)

S

L90 ANSWER 17 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 122:294669 Recovery of technical **sulfur** from concentrates resulted  
      from flotation of ores containing **sulfur**. Fodor, Iosif; Puia,  
      Mircea Laurean; Dajbukat, Martin Vasile (Combinatul Minier, Gura  
      Humorului, Rom.). Rom. RO 103905 B1 **19940620**, 5 pp.  
      (Romanian). CODEN: RUXXA3. APPLICATION: RO 1989-139204 19890412.  
 AB   To optimize the process and increase S yield, S is **melted** from  
      the concs. containing 45-70% S by heating with live steam under known  
      conditions in a an autoclave without stirring in the presence of  
      ≥0.1% additive (relative to the solid content of the concentrate  
      suspension) comprising preferably a mixture of Na tripolyphosphate and  
      Na<sub>2</sub>CO<sub>3</sub> in a 1.4:1 weight ratio and kerosene for pH control, at a ratio of  
      total solids added to **liquid** 1.2:1.1. The process can be used  
      independent of the source or nature of the starting ore.  
 IC   ICM C01B017-033  
 ICS C01B017-05  
 CC   **49-1** (Industrial Inorganic Chemicals)  
 ST   **sulfur** recovery ore flotation conc; sodium tripolyphosphate  
      **sulfur** melt recovery; sodium **carbonate** **sulfur**  
      melt recovery; kerosene **sulfur** melt recovery  
 IT   Kerosine  
      RL: TEM (Technical or engineered material use); USES (Uses)  
          (pH regulator; recovery of tech. **sulfur** from concs. resulted  
          from flotation of ores containing **sulfur**)  
 IT   Recycling  
      (recovery of tech. **sulfur** from concs. resulted from flotation  
      of ores containing **sulfur**)  
 IT   Ore treatment  
      (flotation, concentrate; recovery of tech. **sulfur** from concs.  
      resulted from flotation of ores containing **sulfur**)  
 IT   **497-19-8**, Sodium **carbonate**, uses 7758-29-4, Sodium  
      tripolyphosphate  
      RL: TEM (Technical or engineered material use); USES (Uses)  
          (pH regulator; recovery of tech. **sulfur** from concs. resulted  
          from flotation of ores containing **sulfur**)  
 IT   **7704-34-9P**, **Sulfur**, preparation  
      RL: PUR (Purification or recovery); PREP (Preparation)  
      (recovery of tech. **sulfur** from concs. resulted from flotation

of ores containing **sulfur**)  
IT 497-19-8, Sodium **carbonate**, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(pH regulator; recovery of tech. **sulfur** from concs. resulted  
from flotation of ores containing **sulfur**)  
RN 497-19-8 HCA  
CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



## ●2 Na

IT 7704-34-9P, **Sulfur**, preparation  
RL: PUR (Purification or recovery); PREP (Preparation)  
(recovery of tech. **sulfur** from concs. resulted from flotation  
of ores containing **sulfur**)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

## S

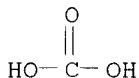
L90 ANSWER 18 OF 54 HCA COPYRIGHT 2004 ACS on STN  
122:191588 Flue Gas Desulfurization Scheme To **Recover** Elemental  
**Sulfur**. Sell, Nancy J.; Norman, Jack C.; Ciriacks, John A.  
(Department of Natural and Applied Sciences, University of Wisconsin,  
Green Bay, WI, 54311-7001, USA). Industrial & Engineering Chemistry  
Research, 34(4), 1428-33 (English) 1995. CODEN: IECRED. ISSN:  
0888-5885. Publisher: American Chemical Society.  
AB A sodium-based flue gas desulfurization process, employing reductive  
burning and a Claus recovery system, has the advantage of producing  
elemental sulfur as a byproduct. This study optimized the process  
conditions for two steps in the proposed reaction scheme: (1) removing  
approx. one-sixth of the sulfur in the spent scrubbing liquor by a  
combination of acidification and evaporation and (2) precipitation of 50% of  
the  
remaining Na<sub>2</sub>SO<sub>3</sub> (s) by the addition of NaHCO<sub>3</sub>/Na<sub>2</sub>CO<sub>3</sub> slurry. Several  
combinations of process conditions can be used to produce favorable  
results, but the optimum from a tech. perspective is to add concentrated H<sub>2</sub>SO<sub>4</sub>  
to the spent liquor to 1.5% volume/volume, concentrate the mixture to 70% by  
weight, and  
then treat it with a >70% solids slurry of NaHCO<sub>3</sub>/Na<sub>2</sub>CO<sub>3</sub>. The optimum  
from an economic perspective is dependent on the relative costs of H<sub>2</sub>SO<sub>4</sub>  
and the steam needed to concentrate the spent liquor.  
CC 49-1 (Industrial Inorganic Chemicals)  
Section cross-reference(s): 59  
ST flue gas desulfurization **sulfur recovery**  
IT Flue gases  
(sodium-based flue gas desulfurization process to **recover**  
**sulfur**)  
IT 144-55-8, Sodium bicarbonate, uses 497-19-8, Sodium  
**carbonate**, uses 7664-93-9, Sulfuric acid, uses

RL: NUU (Other use, unclassified); USES (Uses)  
 (sodium-based flue gas desulfurization process to **recover sulfur**)

IT 7704-34-9P, Sulfur, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (sodium-based flue gas desulfurization process to **recover sulfur**)

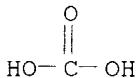
IT 144-55-8, Sodium bicarbonate, uses 497-19-8, Sodium carbonate, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (sodium-based flue gas desulfurization process to **recover sulfur**)

RN 144-55-8 HCA  
 CN Carbonic acid monosodium salt (8CI, 9CI) (CA INDEX NAME)



● Na

RN 497-19-8 HCA  
 CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



●2 Na

IT 7704-34-9P, Sulfur, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (sodium-based flue gas desulfurization process to **recover sulfur**)

RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 19 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 121:86868 Process for **recovering sulfur** from carbon dioxide- and hydrogen sulfide-containing acid gas mixtures. Towler, Gavin P.; Lynn, Scott (University of California, USA). PCT Int. Appl. WO 9413579 A1 **19940623**, 18 pp. DESIGNATED STATES: W: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, VN; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1993-US11927 19931208. PRIORITY: US 1992-991163 19921216.

AB The process comprises contacting the gas at  $\geq 700^\circ$  with

a catalyst that enhances the thermal dissociation of H<sub>2</sub>S to H<sub>2</sub> and S<sub>2</sub>. The equilibrium of the thermal decomposition of H<sub>2</sub>S is shifted by the equilibration of

the water-gas-shift reaction so as to favor the formation of elemental S. The primary products of the overall reaction are S<sub>2</sub>, CO, H<sub>2</sub> and H<sub>2</sub>O. Small amts. of COS, SO<sub>2</sub> and CS<sub>2</sub> may also be formed. Rapid quenching of the reaction mixture to ≤600° results in a substantial increase in the efficiency of the conversion of H<sub>2</sub>S to S. Plant economy is further advanced by treating the product gases to remove byproduct COS by hydrolysis, whereby the COS is converted back to CO<sub>2</sub> and H<sub>2</sub>S.

IC ICM C01B017-04

ICS C01B017-16; C01B031-20; C01B031-26

CC 49-1 (Industrial Inorganic Chemicals)

Section cross-reference(s): 51

IT Natural gas

RL: USES (Uses)  
(carbon dioxide- and hydrogen **sulfide**-containing, **sulfur recovery** from)

IT Transition metal sulfides

RL: CAT (Catalyst use); USES (Uses)  
(decomposition catalysts, for **sulfur recovery** from  
carbon dioxide- and hydrogen sulfide-containing acid gas mixts.)

IT Alcohols, properties

RL: PRP (Properties)  
(C1-4, amino, solns. containing potassium **carbonate** and,  
absorption in, of hydrogen sulfide, in **sulfur recovery** from carbon dioxide- and hydrogen sulfide-containing acid  
gas mixts.)

IT Alcohols, properties

RL: PRP (Properties)  
(C1-4, iminodi-, solns. containing potassium **carbonate** and,  
absorption in, of hydrogen **sulfide**, in **sulfur recovery** from carbon dioxide- and hydrogen sulfide-containing acid  
gas mixts.)

IT 1315-03-3, Vanadium sulfide (V<sub>2</sub>S<sub>3</sub>) 1317-33-5, Molybdenum disulfide, uses  
12018-22-3, Chromium sulfide (Cr<sub>2</sub>S<sub>3</sub>) 12138-09-9, Tungsten disulfide

RL: CAT (Catalyst use); USES (Uses)  
(decomposition catalyst, for **sulfur recovery** from carbon  
dioxide- and hydrogen sulfide-containing acid gas mixts.)

IT 7783-06-4, Hydrogen sulfide, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
(decomposition of, in presence of carbon dioxide, into hydrogen and  
**sulfur**, in natural gas **purification**)

IT 7704-34-9P, Sulfur, preparation

RL: PREP (Preparation)  
(formation of hydrogen and, by hydrogen sulfide decomposition in natural gas  
purification)

IT 124-38-9, Carbon dioxide, uses

RL: USES (Uses)  
(gas mixts. containing hydrogen **sulfide** and, **sulfur recovery** from)

IT 463-58-1, Carbonyl sulfide

RL: RCT (Reactant); RACT (Reactant or reagent)  
(hydrolysis of, for carbon dioxide and hydrogen **sulfide**, in  
**sulfur recovery** from carbon dioxide- and hydrogen  
sulfide-containing acid gas mixts.)

IT 584-08-7P, Potassium **carbonate**

RL: PREP (Preparation)

(solns. containing alkanolamines and dialkanolamines and, absorption in, of hydrogen sulfide, in **sulfur recovery** from carbon dioxide- and hydrogen sulfide-containing acid gas mixts.)

IT **7704-34-9P**, Sulfur, preparation

RL: PREP (Preparation)

(formation of hydrogen and, by hydrogen sulfide decomposition in natural gas purification)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **124-38-9**, Carbon dioxide, uses

RL: USES (Uses)

(gas mixts. containing hydrogen **sulfide** and, **sulfur recovery** from)

RN 124-38-9 HCA

CN Carbon dioxide (8CI, 9CI) (CA INDEX NAME)

O=C=O

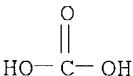
IT **584-08-7P**, Potassium **carbonate**

RL: PREP (Preparation)

(solns. containing alkanolamines and dialkanolamines and, absorption in, of hydrogen sulfide, in **sulfur recovery** from carbon dioxide- and hydrogen sulfide-containing acid gas mixts.)

RN 584-08-7 HCA

CN Carbonic acid, dipotassium salt (8CI, 9CI) (CA INDEX NAME)



● 2 K

L90 ANSWER 20 OF 54 HCA COPYRIGHT 2004 ACS on STN

119:274498 **Purification** of **sulfur**. Ma, Yongming; Han, Yuying; Yan, Yixin (Shanxi University, Peop. Rep. China). Faming Zhuanli Shengqing Gongkai Shuomingshu CN 1073657 A **19930630**, 5 pp. (Chinese). CODEN: CNXXEV. APPLICATION: CN 1991-111804 19911222.

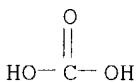
AB The process comprises placing the S-containing material in a vessel heated at 115-445°, introducing water or steam into the vessel to form a gas mixture containing S and water, cooling the gas mixture to precipitate S, and washing and

drying the S. Additive corresponding to 0.01-10% of the S content in the S-containing material may be added to the system for increased efficiency, and the additive is NH<sub>3</sub>, urea or NH<sub>4</sub> salt of a nonoxidizing acid selected from ≥1 of (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>, NH<sub>4</sub>HCO<sub>3</sub>, NH<sub>4</sub>Cl, NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub>, (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub>. The S-containing material is industrial S with high As content, or recovered crude S from industries. The steam is may be superheated steam.

IC ICM C01B017-02

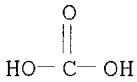
CC **49-1** (Industrial Inorganic Chemicals)

ST   **sulfur purifn**  
IT   Steam  
      (purification with, of crude **sulfur**, additives for, for increased efficiency)  
IT   57-13-6, Urea, uses **506-87-6**, Ammonium **carbonate**  
      **1066-33-7**, Ammonium bicarbonate   7664-41-7, Ammonia, uses  
      7722-76-1   7783-28-0, Ammonium phosphate, dibasic   12125-02-9, Ammonium chloride, uses  
      RL: USES (Uses)  
      (additive, in **sulfur purification** by steam-treating, for increased efficiency)  
IT   **7704-34-9P**, **Sulfur**, preparation  
      RL: PREP (Preparation)  
      (purification of crude, by steam-treating, additives for increased efficiency in)  
IT   7440-38-2, Arsenic, miscellaneous  
      RL: REM (Removal or disposal); PROC (Process)  
      removal of, from industrial **sulfur**, in **sulfur purification**)  
IT   7732-18-5  
      RL: USES (Uses)  
      (steam, **purification** with, of crude **sulfur**, additives for, for increased efficiency)  
IT   **506-87-6**, Ammonium **carbonate** **1066-33-7**,  
      Ammonium bicarbonate  
      RL: USES (Uses)  
      (additive, in **sulfur purification** by steam-treating, for increased efficiency)  
RN   506-87-6   HCA  
CN   Carbonic acid, diammonium salt (8CI, 9CI)   (CA INDEX NAME)



● 2 NH<sub>3</sub>

RN   1066-33-7   HCA  
CN   Carbonic acid, monoammonium salt (8CI, 9CI)   (CA INDEX NAME)



● NH<sub>3</sub>

IT   **7704-34-9P**, **Sulfur**, preparation  
      RL: PREP (Preparation)  
      (purification of crude, by steam-treating, additives for increased efficiency in)  
RN   7704-34-9   HCA  
CN   Sulfur (8CI, 9CI)   (CA INDEX NAME)

S

L90 ANSWER 22 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 116:27118 Removal and **recovery** of **sulfur** dioxide from  
 waste gases, especially from metallurgical plants, and from flue gases.  
 Matschiner, Hermann; Kain, Christoph; Haase, Rudolf; Maschmeier, Claus  
 Peter (Martin-Luther-Universitaet Halle-Wittenberg, Germany). Ger. (East)  
 DD 293999 A5 19910919, 4 pp. (German). CODEN: GEXXA8.

APPLICATION: DD 1989-334815 19891124.

AB SO<sub>2</sub> is removed from flue or waste gases by scrubbing with a sec. amine,  
 e.g., dimethylamine, at 30-80°. The SO<sub>2</sub>-amine adducts are used to  
 manufacture sulfites or bisulfites by reaction with aqueous alkali hydroxides,  
**carbonates**, or bicarbonates. Addnl. S may be used to manufacture  
 thiosulfates. The adduct may be reacted with H<sub>2</sub>S to form S. The amine is  
 recovered for recycling.

IC ICM C01B017-60

ICS C01B017-62; C01B017-98; C01B017-64; B01D053-34

CC 59-4 (Air Pollution and Industrial Hygiene)

Section cross-reference(s): 49, 55, 56

ST **sulfur** dioxide **recovery** flue gas; sulfite manuf sulfur  
 dioxide waste; bisulfite manuf sulfur dioxide waste; thiosulfate manuf  
 sulfur dioxide waste; sulfur manuf sulfur dioxide waste

IT 1310-73-2, Sodium hydroxide, uses

RL: USES (Uses)

(in **recovery** of **sulfur** compds. from waste gases  
 containing sulfur dioxide, dimethylamine in)

IT 7783-06-4, Hydrogen **sulfide**, uses

RL: USES (Uses)

(in **recovery** of **sulfur** from waste gases containing  
 sulfur dioxide, dimethylamine in)

IT 124-40-3, Dimethylamine, uses

RL: USES (Uses)

(in removal and **recovery** of **sulfur** dioxide from  
 waste gases)

IT 463-79-6DP, Carbonic acid, alkali salts 7704-34-9P,  
**Sulfur**, preparation 7772-98-7P, Sodium thiosulfate  
 7782-99-2DP, Sulfurous acid, alkali metal salts 13686-28-7DP,  
 Thiosulfuric acid, alkali metal salts

RL: PREP (Preparation)

(**recovery** of, from waste gases containing sulfur dioxide,  
 dimethylamine in)

IT 463-79-6DP, Carbonic acid, alkali salts 7704-34-9P,

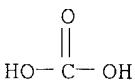
**Sulfur**, preparation

RL: PREP (Preparation)

(**recovery** of, from waste gases containing sulfur dioxide,  
 dimethylamine in)

RN 463-79-6 HCA

CN Carbonic acid (7CI, 8CI, 9CI) (CA INDEX NAME)



RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 24 OF 54 HCA COPYRIGHT 2004 ACS on STN  
113:117877 Manufacture of sublimed amorphous **sulfur**. Krajewski,  
Jan; Gatarz, Zdzislawa; Dojka, Marian; Krawczyk, Boguslaw; Pantula,  
Zbigniew; Warzybok, Jozef; Malarz, Janusz; Kopec, Jozef (Osrodek  
Badawczo-Rozwojowy Przemyslu Siarkowego "Siarkopol", Pol.). Pol. PL  
148229 Bl 19890930, 5 pp. Abstracted and indexed from the  
unexamined application. (Polish). CODEN: POXXA7. APPLICATION: PL  
1987-268208 19871013.

AB S-containing air from S mines is introduced into absorption column and S vapor  
is contacted with counter current-sprayed **liquid**, preferably aqueous  
inorg. salts with alkaline reaction, and the resulting S suspension is  
separated  
by known methods, washed, filtered and dried to obtain fine S powder  
having globular shape.

IC ICM C01B017-10

CC 49-1 (Industrial Inorganic Chemicals)

ST amorphous **sulfur** manufIT 7704-34-9P, **Sulfur**, preparation  
RL: PREP (Preparation)  
(manufacture of amorphous)IT 497-19-8, Sodium **carbonate**, uses and miscellaneous  
RL: USES (Uses)  
(sprayable **liquid** containing, in **sulfur** manufacture by  
resublimation)IT 7704-34-9P, **Sulfur**, preparation  
RL: PREP (Preparation)  
(manufacture of amorphous)

RN 7704-34-9 HCA

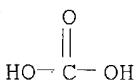
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 497-19-8, Sodium **carbonate**, uses and miscellaneous  
RL: USES (Uses)  
(sprayable **liquid** containing, in **sulfur** manufacture by  
resublimation)

RN 497-19-8 HCA

CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



●2 Na

L90 ANSWER 26 OF 54 HCA COPYRIGHT 2004 ACS on STN  
112:215619 Production of water-**suspendable liquid** or solid

sulfur concentrates. Teren, Jan; Nadvornik, Robert; Hutar, Eduard; Stanik, Vojtech (Czech.). Czech. CS 250858 B1 **19880815**, 8 pp. (Slovak). CODEN: CZXXA9. APPLICATION: CS 1983-5514 19830725.

AB Molten S is emulsified in sulfite waste liquor and/or a lignosulfonic acid salt containing  $\geq 1$  Ca<sup>2+</sup>, Mg<sup>2+</sup>, Fe<sup>2+</sup>, Fe<sup>3+</sup>, Cu<sup>2+</sup>, Mn<sup>2+</sup>, Zn<sup>2+</sup>, Co<sup>2+</sup>, and TiO<sub>2</sub><sup>2+</sup>. Optionally, the sulfite waste liquor is preheated to 65-105°. The S concentrate is a fertilizer. A concentrate was prepared by mixing concentrated sulfite waste liquor (dry matter 52.7%), 546.2, MgSO<sub>4</sub>.7H<sub>2</sub>O 93.9, and H<sub>2</sub>O 72.1 g, at 85°. After settling, the solution (499.7 g) was preheated to 95-105°, and molten S 283.1 g was added. After drying, the solid concentrate contained total S 56.34, total Mg 1.41, water-soluble Mg 1.40, and total Ca 0.30 weight%.

IC ICM C01B017-00

CC 19-6 (Fertilizers, Soils, and Plant Nutrition)

IT **7704-34-9P**, Sulfur, biological studies  
RL: AGR (Agricultural use); BIOL (Biological study); PREP (Preparation); USES (Uses)  
(fertilizer, manufacture of, by emulsification of melt, in sulfite waste liquid and/or lignosulfonate)

IT **546-46-3**, Zinc citrate **546-93-0**, Magnesium carbonate (MgCO<sub>3</sub>) 1309-48-4, Magnesia (MgO), biological studies 7439-89-6D, Iron, salts 7439-96-5D, Manganese, salts 7440-32-6D, Titanium, salts 7440-48-4D, Cobalt, salts 7440-50-8D, Copper, salts 7440-66-6D, Zinc, salts 7487-88-9, Sulfuric acid magnesium salt (1:1), biological studies 7720-78-7 7733-02-0, Zinc sulfate (ZnSO<sub>4</sub>) 7758-98-7, Sulfuric acid copper(2+) salt (1:1), biological studies 8062-15-5D, Lignosulfonic acid, salts 12519-36-7, Zinc EDTA 15498-89-2  
RL: BIOL (Biological study)  
(in sulfur fertilizer concentrate manufacture)

IT **7704-34-9P**, Sulfur, biological studies  
RL: AGR (Agricultural use); BIOL (Biological study); PREP (Preparation); USES (Uses)  
(fertilizer, manufacture of, by emulsification of melt, in sulfite waste liquid and/or lignosulfonate)

RN 7704-34-9 HCA

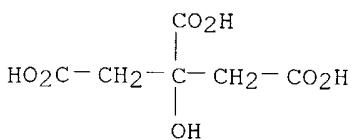
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **546-46-3**, Zinc citrate **546-93-0**, Magnesium carbonate (MgCO<sub>3</sub>)  
RL: BIOL (Biological study)  
(in sulfur fertilizer concentrate manufacture)

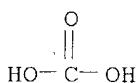
RN 546-46-3 HCA

CN 1,2,3-Propanetricarboxylic acid, 2-hydroxy-, zinc salt (2:3) (9CI) (CA INDEX NAME)



● 3/2 Zn

RN 546-93-0 HCA  
 CN Carbonic acid, magnesium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Mg

L90 ANSWER 27 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 112:23522 MHD seed recovery and regeneration. McIlroy, R. A.; Probert, P. B.; Jackson, D. M.; Lahoda, E. J. (Babcock and Wilcox Co., USA). Proceedings of the Intersociety Energy Conversion Engineering Conference, 24th(Vol. 2), 1025-31 (English) 1989. CODEN: PIECDE. ISSN: 0146-955X.

AB A process is described for regeneration of K<sub>2</sub>CO<sub>3</sub> seed from spent material recovered as K<sub>2</sub>SO<sub>4</sub> from the residues of coal-fired MHD generators; the process is based on reduction of SO<sub>4</sub><sup>2-</sup> followed by separation of S and K. Reduction is

carried out in a rotary kiln by combustion of K<sub>2</sub>SO<sub>4</sub>-coal mixts. (2:1) at 700°; K<sub>2</sub>S<sub>2</sub> forms and is dissolved to form a green liquor which is clarified and then **carbonated** to H<sub>2</sub>S and K<sub>2</sub>CO<sub>3</sub>, by a modified Tampella process. The H<sub>2</sub>S is converted to elemental S using the Claus process; K<sub>2</sub>CO<sub>3</sub> is purified by crystallization to 95% purity, with Na and Cl as main impurities. The flue gas from the kiln is treated in scrubbers to **recover H<sub>2</sub>S**; the plant also has waste heat recovery systems to improve the energy balance.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 49, 51, 59

ST potassium **carbonate** seed MHD recovery; MHD generator potassium seed recovery; redn potassium sulfate coal kiln; carbonation potassium MHD seed recovery; flue gas potassium sulfate redn; waste heat MHD seed recovery

IT Air pollution  
 (by flue gases, from potassium sulfate-coal combustion, in potassium **carbonate** MHD seed recovery process, abatement of)

IT Flue gases  
 (from potassium sulfate-coal combustion, in potassium **carbonate** MHD seed recovery process, cleaning of)

IT Ashes (residues)  
 (from potassium sulfate-coal combustion, in potassium **carbonate** MHD seed recovery process, disposal of)

IT Reduction

(of potassium sulfate, by coal, in rotary kiln, for potassium carbonate MHD generator seed recovery)

IT Electric generators  
(MHD, potassium carbonate seed for, recovery of, reduction/carbonation process for)

IT Heat  
(waste, recovery of, from potassium sulfate-coal combustion, in potassium carbonate MHD seed recovery process)

IT 7783-06-4P, Hydrogen sulfide, preparation  
RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(formation and decomposition of, sulfur recovery by, in recovery/regeneration of potassium carbonate, for MHD generator seed)

IT 7704-34-9P, Sulfur, preparation  
RL: FORM (Formation, nonpreparative); PREP (Preparation)  
(formation of, in recovery of potassium carbonate, for MHD generator seed)

IT 584-08-7P, Potassium carbonate (K<sub>2</sub>CO<sub>3</sub>)  
RL: PREP (Preparation)  
(recovery of, potassium sulfate reduction/carbonation process for, for MHD generator seed)

IT 7778-80-5, Potassium sulfate (K<sub>2</sub>SO<sub>4</sub>), reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reduction of, by coal, in rotary kiln, for potassium carbonate MHD generator seed recovery)

IT 7704-34-9P, Sulfur, preparation  
RL: FORM (Formation, nonpreparative); PREP (Preparation)  
(formation of, in recovery of potassium carbonate, for MHD generator seed)

RN 7704-34-9 HCA

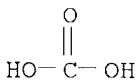
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 584-08-7P, Potassium carbonate (K<sub>2</sub>CO<sub>3</sub>)  
RL: PREP (Preparation)  
(recovery of, potassium sulfate reduction/carbonation process for, for MHD generator seed)

RN 584-08-7 HCA

CN Carbonic acid, dipotassium salt (8CI, 9CI) (CA INDEX NAME)



●2 K

L90 ANSWER 28 OF 54 HCA COPYRIGHT 2004 ACS on STN  
111:197844 Process for removal of hydrogen sulfide from sour gas streams.  
Byers, Dallas L. (Shell Oil Co., USA). U.S. US 4840782 A  
19890620, 9 pp. Cont. of U.S. Ser. No. 937,446, abandoned.  
(English). CODEN: USXXAM. APPLICATION: US 1987-139140 19871221.  
PRIORITY: US 1984-614363 19840529; US 1985-790763 19851023; US 1986-937446

19861205.

AB H<sub>2</sub>S is removed from sour gas by contacting the sour gas stream in a contacting zone with an aqueous reaction solution substantially free of anthraquinone disulfonate (<0.2 g/L) and containing an effective amount of V<sup>5+</sup> ions to oxidize H<sub>2</sub>S, producing a sweet gas stream and an aqueous solution containing solid S and V<sup>4+</sup> ions. The reaction solution has a pH of 8-11 and also contains an amount of phosphate ions sufficient to provide a molar ratio of phosphate ions to V<sup>4+</sup> ions ≥0.1. The solid S is removed from the aqueous solution and the remaining aqueous solution is regenerated and recycled.

IC ICM C01B017-05

NCL 423576600

CC 48-1 (Unit Operations and Processes)  
Section cross-reference(s): 49, 51

IT Fuel gases

Natural gas

RL: USES (Uses)

(hydrogen sulfide removal from, by oxidation with solution containing vanadium ions and phosphate ions)

IT 107-70-0 108-10-1, Methyl isobutyl ketone 108-32-7, Propylene carbonate 108-94-1, Cyclohexanone, uses and miscellaneous 110-13-4, 2,5-Hexanedione 111-46-6, Diethylene glycol, uses and miscellaneous 111-90-0, Diethylene glycol monoethyl ether 112-60-7, Tetraethylene glycol 123-42-2, Diacetone alcohol 123-54-6, 2,4-Pentanedione, uses and miscellaneous 126-33-0, Sulfolane 141-79-7, Mesityl oxide 142-92-7, Hexyl acetate 143-24-8, Tetraethylene glycoldimethyl ether 872-50-4, N-Methyl pyrrolidone, uses and miscellaneous

RL: USES (Uses)

(absorbent, for removal of hydrogen sulfide from sour gas streams)

IT 7704-34-9P, Sulfur, preparation

RL: FORM (Formation, nonpreparative); PREP (Preparation)  
(formation of, from hydrogen sulfide oxidation with vanadium ion containing solution, in sour gas treatment)

IT 7632-05-5, Sodium phosphate 10124-31-9, Ammonium phosphate 10377-52-3, Lithium phosphate 11105-06-9, Sodium vanadate 11115-67-6, Ammonium vanadate 11126-15-1, Lithium vanadium oxide 11126-20-8, Potassium vanadate 16068-46-5, Potassium phosphate

RL: USES (Uses)

(in removal of hydrogen sulfide by oxidation, from sour gas streams)

IT 124-38-9, Carbon dioxide, uses and miscellaneous

RL: REM (Removal or disposal); PROC (Process)  
(removal of, from sour gas containing hydrogen sulfide)

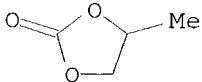
IT 108-32-7, Propylene carbonate 110-13-4,  
2,5-Hexanedione 123-54-6, 2,4-Pentanedione, uses and miscellaneous

RL: USES (Uses)

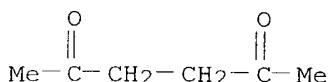
(absorbent, for removal of hydrogen sulfide from sour gas streams)

RN 108-32-7 HCA

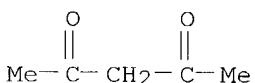
CN 1,3-Dioxolan-2-one, 4-methyl- (9CI) (CA INDEX NAME)



RN 110-13-4 HCA  
 CN 2,5-Hexanedione (8CI, 9CI) (CA INDEX NAME)



RN 123-54-6 HCA  
 CN 2,4-Pentanedione (8CI, 9CI) (CA INDEX NAME)



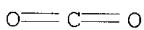
IT 7704-34-9p, Sulfur, preparation  
 RL: FORM (Formation, nonpreparative); PREP (Preparation)  
 (formation of, from hydrogen sulfide oxidation with  
 vanadium ion containing solution, in sour gas treatment)

RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 124-38-9, Carbon dioxide, uses and miscellaneous  
 RL: REM (Removal or disposal); PROC (Process)  
 (removal of, from sour gas containing hydrogen sulfide)

RN 124-38-9 HCA  
 CN Carbon dioxide (8CI, 9CI) (CA INDEX NAME)



L90 ANSWER 30 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 109:112575 Effect of the method of copper oxide addition on chemisorption properties of zinc-containing sulfur-purification materials. Dantsig, G. A.; Grechenko, A. N.; Grigorev, V. V.; Serova, L. P.; Yagodkina, G. N. (Gos. Inst. Azotn. Prom. Prod. Org. Sint., Novomoskovsk, USSR). Zhurnal Prikladnoi Khimii (Sankt-Peterburg, Russian Federation), 61(6), 1240-6 (Russian) 1988. CODEN: ZPKHAB.  
 ISSN: 0044-4618.

AB The chemisorption of H<sub>2</sub>S and other S-containing materials on S-purification agents (oxides, e.g., GIAP-10-2) occurs 50-70° lower than on activated ZnO. The effect of CuO on the sorption properties of S-purification agents was studied using a mixture of basic carbonates of Zn and Cu and a mixture of ZnO and CuO treated with (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>. The presence of Cu in the mixture significantly enhanced the decomposition of H<sub>2</sub>S before chemisorption. The (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub> treatment of CuO and ZnO resulted in the formation of double salts, which, after being reduced by H<sub>2</sub>, facilitated the introduction of Cu into the ZnO lattice. The Cu in the S-purification agents acts as a promoter, enhancing the reaction between H<sub>2</sub>S and ZnO.

CC 48-1 (Unit Operations and Processes)  
 Section cross-reference(s): 49  
 ST copper oxide hydrogen sulfide sorbent; zinc oxide hydrogen sulfide

sorbent; **sulfur purifn** material hydrogen  
**sulfide** sorbent

IT 1317-38-0, Copper oxide, uses and miscellaneous  
 RL: USES (Uses)  
 (chemisorption of hydrogen sulfide on zinc-containing **sulfur-purification** agents in relation to)

IT 7783-06-4, Hydrogen sulfide, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (chemisorption of, on zinc-containing **sulfur-purification** agents, copper oxide effect on)

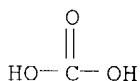
IT 506-87-6, Ammonium **carbonate**  
 RL: USES (Uses)  
 (in preparation of zinc oxide, for **purification of sulfur**)

IT 7704-34-9P, **Sulfur**, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (purification of, zinc-containing agent for, hydrogen sulfide chemisorption by)

IT 506-87-6, Ammonium **carbonate**  
 RL: USES (Uses)  
 (in preparation of zinc oxide, for **purification of sulfur**)

RN 506-87-6 HCA

CN Carbonic acid, diammonium salt (8CI, 9CI) (CA INDEX NAME)



●2 NH<sub>3</sub>

IT 7704-34-9P, **Sulfur**, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (purification of, zinc-containing agent for, hydrogen sulfide chemisorption by)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 31 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 109:60724 Process for removing hydrogen sulfide from gas streams. De Haan,  
 Robert; Dry, Mark Eberhard; Dressler, Flemming Hermann; Hesse, Horst  
 Joachim Franz August (Sasol Operations (Pty.) Ltd., S. Afr.). S. African  
 ZA 8703112 A 19871230, 25 pp. (English). CODEN: SFXXAB.  
 APPLICATION: ZA 1987-3112 19870430. PRIORITY: ZA 1986-3264 19860501.

AB H<sub>2</sub>S is removed from waste gases by scrubbing with an alkaline solution containing oxovanadium (V), with alkalinity present as OH<sup>-</sup>, CO<sub>3</sub><sup>2-</sup>, and HCO<sub>3</sub><sup>-</sup> to maintain the pH at 7.4-9 where CO<sub>3</sub><sup>2-</sup> in <12.5 g/L. The oxovanadium (IV) produced from S oxidation can be oxidized to the pentavalent form by bubbling an O-containing gas through the scrubbing solution. A scrubbing solution containing pentavalent V 1.9, Na<sub>2</sub>CO<sub>3</sub> 40, diethanol amine 40, and NaSCN 20 g/L was used to remove 97.7% of H<sub>2</sub>O present at 1% in CO<sub>2</sub>, for a solution loading of

300 mg H<sub>2</sub>S/L. The S formed was recovered from froth in the oxidizer.

IC ICM C01B  
ICS B01D; C07C; C01G

CC 59-4 (Air Pollution and Industrial Hygiene)  
Section cross-reference(s): **49**

ST hydrogen sulfide scrubbing waste gas; **sulfur recovery**  
hydrogen **sulfide** scrubbing; vanadium pentoxide hydrogen sulfide  
scrubbing

IT 16408-26-7  
RL: OCCU (Occurrence)  
(hydrogen sulfide removal from gas by scrubbing with, with  
**sulfur recovery**)

IT **7704-34-9P, Sulfur**, preparation  
RL: PREP (Preparation)  
(**recovery** of, in hydrogen **sulfide** scrubbing from  
gas with vanadium pentoxide)

IT 7783-06-4, Hydrogen sulfide, uses and miscellaneous  
RL: REM (Removal or disposal); PROC (Process)  
(removal of, from gas, scrubbing with vanadium pentoxide for,  
**sulfur recovery** in)

IT 111-42-2, Diethanol amine, uses and miscellaneous **497-19-8**,  
Sodium **carbonate**, uses and miscellaneous 540-72-7, Sodium  
thiocyanate  
RL: USES (Uses)  
(scrubbing solution containing, for hydrogen sulfide removal from gas)

IT **7704-34-9P, Sulfur**, preparation  
RL: PREP (Preparation)  
(**recovery** of, in hydrogen **sulfide** scrubbing from  
gas with vanadium pentoxide)

RN 7704-34-9 HCA

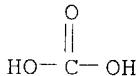
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **497-19-8**, Sodium **carbonate**, uses and miscellaneous  
RL: USES (Uses)  
(scrubbing solution containing, for hydrogen sulfide removal from gas)

RN 497-19-8 HCA

CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



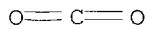
●2 Na

L90 ANSWER 33 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 107:239266 Preparation of elementary **sulfur** from pyrites of any  
 source and pyritic concentrates, in dry form at atmospheric pressure.  
 Saddy, Maury (Centro de Tecnologia Promon-CTP, Brazil). Braz. Pedido PI  
 BR 8506126 A **19870630**, 6 pp. (Portuguese). CODEN: BPXXDX.  
 APPLICATION: BR 1985-6126 19851206.

AB The title process includes thermal decomposition of pyrite in a

**fluidized** bed at 400-1200° to produce S by condensation of S vapor as well as a mixture of pyrrhotite and diverse residues, magnetic separation of the pyrrhotite from the other residues for recycling as a feed to the **fluidized** bed, operating with an excess of air at 400-1200° to produce Fe<sub>2</sub>O<sub>3</sub> and SO<sub>2</sub>. Fuel is fed to a combustion reactor in the **fluidized** bed, operating with 20% excess air at 600-1200°, and 100% excess CaCO<sub>3</sub> is added to react with the toxic SO<sub>2</sub> to produce CaSO<sub>4</sub>, CaO, and CO<sub>2</sub>. The heat of the gases from combustion and roasting may be partially used in the 1st and 2nd stages of the process for drying and thermal decomposition

IC ICM C22B001-10  
 ICS C01B017-00  
 CC 49-1 (Industrial Inorganic Chemicals)  
 ST sulfur prodn pyrite thermal decompn; ferric oxide byproduct  
 sulfur prodn; calcium sulfate byproduct sulfur prodn;  
 calcium oxide byproduct sulfur prodn; carbon dioxide formation  
 sulfur prodn  
 IT 1310-50-5P, Pyrrhotite  
 RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (formation and thermal decomposition of, in **sulfur** production from pyrite)  
 IT 1309-37-1P, Ferric oxide, preparation 7446-09-5P, **Sulfur**  
 dioxide, preparation  
 RL: FORM (Formation, nonpreparative); PREP (Preparation)  
 (formation of, in thermal decomposition of pyrrhotite, in **sulfur** production from pyrite)  
 IT 124-38-9P, Carbon dioxide, preparation 1305-78-8P, Calcium  
 oxide, preparation 7778-18-9P, Calcium sulfate  
 RL: PREP (Preparation)  
 (formation, of, by calcium **carbonate** reaction with  
 sulfur dioxide from pyrrhotite thermal decomposition in  
 sulfur production from pyrite)  
 IT 7704-34-9P, **Sulfur**, preparation  
 RL: PREP (Preparation)  
 (production of, from pyrite, by thermal decomposition)  
 IT 471-34-1P, Calcium **carbonate**, reactions  
 RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (reaction of, with **sulfur** dioxide from pyrrhotite thermal  
 decomposition in **sulfur** production from pyrite)  
 IT 1309-36-0P, Pyrite, reactions  
 RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (thermal decomposition of, **sulfur** production and phyrhotite formation  
 by)  
 IT 124-38-9P, Carbon dioxide, preparation  
 RL: PREP (Preparation)  
 (formation, of, by calcium **carbonate** reaction with  
 sulfur dioxide from pyrrhotite thermal decomposition in  
 sulfur production from pyrite)  
 RN 124-38-9 HCA  
 CN Carbon dioxide (8CI, 9CI) (CA INDEX NAME)



IT 7704-34-9P, **Sulfur**, preparation  
 RL: PREP (Preparation)  
 (production of, from pyrite, by thermal decomposition)  
 RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

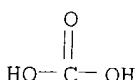
S

IT 471-34-1P, Calcium **carbonate**, reactions

RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (reaction of, with **sulfur** dioxide from pyrrhotite thermal  
 decomposition in **sulfur** production from pyrite)

RN 471-34-1 HCA

CN Carbonic acid calcium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Ca

L90 ANSWER 34 OF 54 HCA COPYRIGHT 2004 ACS on STN

107:83651 Method for purifying stratal and drainage water of **sulfur** pits. Gorshkov, V. P.; Salyuk, A. P. (USSR). U.S.S.R. SU 1296517 A1  
**19870315** From: Otkrytiya, Izobret. 1987, (10), 104. (Russian).  
 CODEN: URXXAF. APPLICATION: SU 1985-3852230 19850206.

AB Title method includes removal of suspended and **colloidal** contaminants, air stripping of **H2S** with subsequent chemical treatment of the air-gas mixture and separation of the treated air, electrochem.

treatment of the water, anion exchange filtration, and regeneration of the anion exchanger. For a no-waste process, a decrease in reagent consumption, and use of the treated water as heat carrier for underground melting of S, after the suspended and **colloidal** contaminants are removed hydroacoustically as concentrated product and electrochem. treatment of clarified water in an electrolyzer, the anolyte is fed to the stripping stage and anion exchanged and the catholyte is mixed with the air-gas mixture after the chemical treatment stage and after removal of  $\text{CaCO}_3$  and  $\text{MgCO}_3$  in a sand filter, part of it is recombined with the treated anolyte and use for heat exchange. The other part of the treated catholyte is used to regenerate the anion exchanger and the spent regeneration solution is used to wash the sand filter, then containing  $\text{CaCO}_3$  and  $\text{MgCO}_3$ , used for chemical treatment of the air-gas mixture, and mixed with the concentrated products centrifuged. The sediment is discharged and the centrifugate is mixed with incoming water. The sep. treated air, after catholyte mixing with the air-gas mixture, is recycled to the stripping stage.

IC ICM C02F009-00

CC 61-5 (Water)

Section cross-reference(s): 49

ST waste free **sulfur** pit water treatment; hydrogen **sulfide** air stripping water; electrochem treatment **sulfur** pit water; anion exchange **sulfur** pit water

IT Water purification

(anion exchange, in multistage treatment of **sulfur** pit stratal and drainage waters, with anion exchanger regeneration)

IT Water purification

(electrodialysis, anolyte and catholyte from, recycling of, in

treatment of **sulfur** pit stratal and drainage waters)

IT Water purification  
 (stripping, air, hydrogen **sulfide** removal in, of  
**sulfur** pit stratal and drainage water)

IT 7704-34-9P, **Sulfur**, uses and miscellaneous  
 RL: PREP (Preparation); USES (Uses)  
 (drainage and stratal waters from pits for production of, multistage  
 treatment of, waste free)

IT 471-34-1, Calcium **carbonate**, uses and miscellaneous  
 546-93-0, Magnesium **carbonate**  
 RL: REM (Removal or disposal); PROC (Process)  
 (removal of, from catholyte mixture with hydrogen **sulfide**  
 -containing stripping air, in **sulfur** pit water treatment)

IT 7783-06-4, Hydrogen **sulfide**, uses and miscellaneous  
 RL: REM (Removal or disposal); PROC (Process)  
 (removal of, from **sulfur** pit stratal and drainage water, air  
 stripping for)

IT 7704-34-9P, **Sulfur**, uses and miscellaneous  
 RL: PREP (Preparation); USES (Uses)  
 (drainage and stratal waters from pits for production of, multistage  
 treatment of, waste free)

RN 7704-34-9 HCA

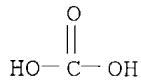
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 471-34-1, Calcium **carbonate**, uses and miscellaneous  
 546-93-0, Magnesium **carbonate**  
 RL: REM (Removal or disposal); PROC (Process)  
 (removal of, from catholyte mixture with hydrogen **sulfide**  
 -containing stripping air, in **sulfur** pit water treatment)

RN 471-34-1 HCA

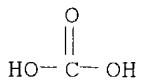
CN Carbonic acid calcium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Ca

RN 546-93-0 HCA

CN Carbonic acid, magnesium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Mg

106:122369 Method of **winning** of elemental **sulfur** from sulfur ore. Bylo, Zbigniew; Kolenda, Zygmunt; Jarosinska, Krystyna; Malinowska, Kazimiera; Krajewski, Jan; Krzeminski, Marian; Bold, Stanislaw; Kosinski, Zenobiusz (Akademia Gorniczo-Hutnicza, Pol.; Osrodek Badawczo-Rozwojowy Przemyslu Siarkowego "Siarkopol"). Pol. PL 127859 Bl 19860210, 2 pp. (Polish). CODEN: POXXA7. APPLICATION: PL 1981-230270 19810319.

AB After conventional flotation of a S ore (containing .apprx.18% S), the remelting S concentrate is leached to remove CaCO<sub>3</sub>. Leaching is done by passing

SO<sub>2</sub> for 1-3 h through a slurry containing 1-2.5 ton water/ton S concentrate at 293-313 K. The S concentrate is separated from the formed Ca(HSO<sub>3</sub>)<sub>2</sub> solution which is

used for cellulose manufacture Then, the S concentrate is subjected to conventional

pressure-filtration refining. Thus, 200 kg S concentrate containing 76.45% S was

mixed with 500 kg water, and the resulting slurry was blown 60 min with SO<sub>2</sub> at 293 K. The S concentrate was separated from the resulting Ca(HSO<sub>3</sub>)<sub>2</sub> solution,

washed, and dried at 378 K. The S content in the concentrate was 85.76%.

IC C01B017-027

CC 49-1 (Industrial Inorganic Chemicals)

Section cross-reference(s): 43

ST **sulfur recovery** ore refining; calcium carbonate removal sulfur conc; sulfite calcium hydrogen sulfur

IT Leaching

(of sulfur concentrate for calcium carbonate removal)

IT 13780-03-5P

RL: FORM (Formation, nonpreparative); PREP (Preparation)  
(formation of, in removal of calcium carbonate from sulfur concentrate by leaching with sulfur dioxide)

IT 7446-09-5, Sulfur dioxide, uses and miscellaneous

RL: RCT (Reactant); RACT (Reactant or reagent)

(leaching by, of sulfur concentrate, for calcium carbonate removal)

IT 7704-34-9P, **Sulfur**, preparation

RL: PREP (Preparation)  
(recovery of, from ore, concentrate leaching for calcium carbonate removal in relation to)

IT 471-34-1, Calcium carbonate, uses and miscellaneous

RL: REM (Removal or disposal); PROC (Process)

(removal of, from sulfur concentrate, by leaching with sulfur dioxide)

IT 7704-34-9P, **Sulfur**, preparation

RL: PREP (Preparation)  
(recovery of, from ore, concentrate leaching for calcium carbonate removal in relation to)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

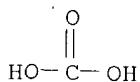
S

IT 471-34-1, Calcium carbonate, uses and miscellaneous  
RL: REM (Removal or disposal); PROC (Process)

(removal of, from sulfur concentrate, by leaching with sulfur dioxide)

RN 471-34-1 HCA

CN Carbonic acid calcium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Ca

L90 ANSWER 37 OF 54 HCA COPYRIGHT 2004 ACS on STN  
105:26587 **Winning of pure sulfur from**

**sulfur ore.** Bylo, Zbigniew; Kolenda, Zygmunt; Jarosinska, Krystyna; Malinowska, Kazimiera; Krajewski, Jan; Krzeminski, Marian; Bold, Stanislaw; Kosinski, Zenobiusz (Akademia Gorniczo-Hutnicza, Pol.; Osrodek Badawczo-Rozwojowy Przemyslu Siarkowego "Siarkopol"). Pol. PL 127849 B1 19831130, 2 pp. (Polish). CODEN: POXXA7. APPLICATION: PL 1981-230047 19810306.

AB The yield of S was increased and the weight of **carbonate** residues was decreased when CO<sub>2</sub> was passed through S concentrate obtained from an ore containing 18% elemental S. Thus, 200 kg S concentrate (76.45% elemental S) and 200

kg water were stirred at 293 K while CO<sub>2</sub> was bubbled through for 60 min. Filtration, washing of filter cake, and drying gave enriched S concentrate containing 81.24% elemental S.

IC C01B017-027

CC 49-1 (Industrial Inorganic Chemicals)

ST Section cross-reference(s): 54

ST sulfur conc **carbonate** removal carbonation

IT 7704-34-9P, preparation

RL: PREP (Preparation)

(concentration of, from sulfur-containing ores, by carbon dioxide treatment)

IT 124-38-9, uses and miscellaneous

RL: USES (Uses)

(sulfur-containing ores treated with, for sulfur enrichment)

IT 7704-34-9P, preparation

RL: PREP (Preparation)

(concentration of, from sulfur-containing ores, by carbon dioxide treatment)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

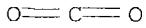
IT 124-38-9, uses and miscellaneous

RL: USES (Uses)

(sulfur-containing ores treated with, for sulfur enrichment)

RN 124-38-9 HCA

CN Carbon dioxide (8CI, 9CI) (CA INDEX NAME)



L90 ANSWER 38 OF 54 HCA COPYRIGHT 2004 ACS on STN  
102:81133 **Sulfur** and calcium **carbonate** from gypsum.

Batista de Queiroz, Agnaldo; Peres, Luciano dos Santos (Fundacao Instituto Tecnologico do Estado de Pernambuco, Brazil). Braz. Pedido PI BR 8300949

A 19841002, 12 pp. (Portuguese). CODEN: BPXXDX. APPLICATION:  
BR 1983-949 19830113.

AB S and CaCO<sub>3</sub> are produced from gypsum in a multistage process. Crushed gypsum is calcined to the hemihydrate, reduced in a reducing zone (900-1000°) with charcoal and gases from the carbonization of firewood or cane bagasse, pelletized by rehydration of the hemihydrate to the dihydrate, which is reduced to CaS (with CO<sub>2</sub> and water recovery), and cooled, milled, and wetted to make a slurry. The liquid and solid phases are separated by centrifuges and pressurized filters, and the clear liquid containing soluble Ca(HS)<sub>2</sub> is fed under pressure to a 2nd reactor receiving CO<sub>2</sub> to cause formation of H<sub>2</sub>S and impurity-free CaCO<sub>3</sub> precipitate. The H<sub>2</sub>S produced in the 2nd reactor is fed under pressure to the 1st reactor, wherein S is produced by the Claus-Chance process.

IC C01F011-08

CC 49-9 (Industrial Inorganic Chemicals)

ST gypsum calcium carbonate sulfur prodn

IT 13397-24-5P, preparation

RL: PREP (Preparation)

(calcium carbonate and sulfur manufacture from)

IT 471-34-1P, preparation 7704-34-9P, preparation

RL: PREP (Preparation)

(preparation of, from gypsum)

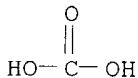
IT 471-34-1P, preparation 7704-34-9P, preparation

RL: PREP (Preparation)

(preparation of, from gypsum)

RN 471-34-1 HCA

CN Carbonic acid calcium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Ca

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

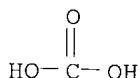
S

L90 ANSWER 39 OF 54 HCA COPYRIGHT 2004 ACS on STN

100:90660 Desulfurization by three-stage combustion. (Hitachi Shipbuilding and Engineering Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 58190606 A2  
19831107 Showa, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION:  
JP 1982-71978 19820428.

AB Flue gas is desulfurized by a 3-stage combustion system having desulfurizing agent recovery unit, Claus S recovery unit, and a secondary desulfurizing apparatus. A fuel is fed to the 1st and 2nd combustors and then further combusted in a 3rd combustor with a secondary air supply. The flue gas is then treated in the secondary desulfurizing apparatus. A desulfurizing agent (CaCO<sub>3</sub>, Na<sub>2</sub>CO<sub>3</sub>) and a portion of the effluent from the Claus unit are fed to the 2nd combustor. The spent desulfurizing agent is retrieved from the 2nd combustor to convert to carbonate which is recycled. The effluent from the carbonate converter is

treated in a Claus unit to recover S.  
 IC F23C011-00; B01D053-34; C01B017-04; F23C006-04  
 CC 59-4 (Air Pollution and Industrial Hygiene)  
 Section cross-reference(s): 49  
 IT Flue gases  
     (desulfurization of, 3-stage combustion system for, desulfurizing agent and **sulfur recovery** in)  
 IT 497-19-8, uses and miscellaneous  
 RL: USES (Uses)  
     (for flue gas desulfurization, recycling of)  
 IT 7704-34-9P, preparation  
 RL: PREP (Preparation)  
     (recovery of, from flue gas desulfurization)  
 IT 497-19-8, uses and miscellaneous  
 RL: USES (Uses)  
     (for flue gas desulfurization, recycling of)  
 RN 497-19-8 HCA  
 CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



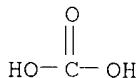
## ●2 Na

IT 7704-34-9P, preparation  
 RL: PREP (Preparation)  
     (recovery of, from flue gas desulfurization)  
 RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 40 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 98:18862 Recovery of calcium **carbonate** and sulfur from FGD scrubber waste. Arganbright, R. P.; Huang, P.; Benner, G. S.; Mandelik, B. G.; Roche, T. S. (Pullman Kellogg, Houston, TX, USA). Report, EPA-600/7-82-015; Order No. PB82-227729, 143 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1982, 82(20), 4091 (English) 1982.  
 AB The key process steps in the proprietary Kel-S process are demonstrated for recovering CaCO<sub>3</sub> and S from lime/limestone flue gas desulfurization (FGD) scrubber waste. The steps are: reduction of the waste to CaS (using coal as the reducing agent), carbonation of the CaS to generate H<sub>2</sub>S and CaCO<sub>3</sub>, and **recovery** of precipitated CaCO<sub>3</sub> from inerts (coal ash).  
 CC 49-5 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 59  
 ST flue gas desulfurization; **sulfur recovery**; calcium **carbonate** recovery  
 IT Flue gases  
     (desulfurization of, calcium **carbonate** and **sulfur recovery** from)  
 IT 471-34-1P, preparation 7704-34-9P, preparation

IT    RL: PREP (Preparation)  
       (recovery of, from limestone flue gas desulfurization scrubber waste)  
**471-34-1P**, preparation **7704-34-9P**, preparation  
 RL: PREP (Preparation)  
       (recovery of, from limestone flue gas desulfurization scrubber waste)  
 RN    471-34-1 HCA  
 CN    Carbonic acid calcium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



## ● Ca

RN    7704-34-9 HCA  
 CN    Sulfur (8CI, 9CI) (CA INDEX NAME)

## S

L90 ANSWER 41 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 97:8588 Removing hydrogen sulfide from gas streams. Gowdy, Hugh W.; Fenton,  
 Donald M. (Union Oil Co., USA). U.S. US 4325936 A **19820420**, 11  
 pp. Cont.-in-part of U.S. Ser. No. 50,193, abandoned. (English). CODEN:  
 USXXAM. APPLICATION: US 1981-233888 19810212. PRIORITY: US 1979-50193  
 19790620.

AB    A H<sub>2</sub>S removal and conversion method is described, in which a H<sub>2</sub>S-containing  
 gas stream is contacted with a regenerable washing solution containing  
 solubilized V thiocyanate ions, a carboxylate complexing agent, and one or  
 more water-soluble quinones capable of solubilizing tetravalent V. The molar  
 ratio of V to quinone(s) in the washing solution is selected to substantially  
 reduce or eliminate the formation of contaminant sulfate salts. The  
 absorbed H<sub>2</sub>S is converted to elemental S which, after oxidative  
 regeneration of the washing solution, is separated from the regenerated  
 solution

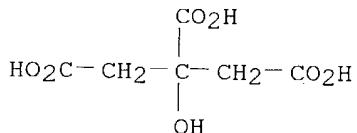
Thus, a gas containing H<sub>2</sub>S 1, CO<sub>2</sub> 7, and N<sub>2</sub> 92 mol% was washed for 16.8 days  
 at 60°F and 1 atm with 0.037 L of washing solution/L of H<sub>2</sub>S-containing  
 gas. The washing solution contained (in g/L): V 4.2, di-Na salt of  
 9,10-anthraquinone disulfonic acid (ADA, di-Na salt) 1.4, Na  
 1-hydroxybenzene-4-sulfonate (PSA) 22, NaSCN 87, Na citrate 13-16, Na  
 carbonate 24, Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> <0.2, and Na<sub>2</sub>SO<sub>4</sub> 1.3-2.6. The rates of  
 change (g/L day) were: V 0.0, ADA di-Na salt 0.0, PSA Na salt 0.0, Na  
 citrate loss 0.16, Na carbonate 0.0, Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 0.0, Na<sub>2</sub>SO<sub>4</sub> gain  
 0.07. The mol. ratios were V/ADA 24 and V/PSA 0.74. The amount of H<sub>2</sub>S  
 converted was: to S<sub>2</sub>O<sub>3</sub><sup>2-</sup> salts 0.0 and SO<sub>4</sub><sup>2-</sup> salts 0.3%.

IC    C01B017-05  
 NCL    423573000R  
 CC    **49-10** (Industrial Inorganic Chemicals)  
       Section cross-reference(s): 48  
 ST    hydrogen sulfide removal gas; quinone solubilizer vanadium; **sulfur**  
       **recovery**  
 IT    **7704-34-9P**, preparation  
 RL: PREP (Preparation)  
       (recovery of, from hydrogen **sulfide**-containing gases,

recyclable washing solution for)  
IT 994-36-5 1300-51-2 60553-45-9  
RL: USES (Uses)  
(solubilization by, of tetramine vanadium)  
IT 7704-34-9P, preparation  
RL: PREP (Preparation)  
(recovery of, from hydrogen sulfide-containing gases,  
recyclable washing solution for)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 994-36-5  
RL: USES (Uses)  
(solubilization by, of tetramine vanadium)  
RN 994-36-5 HCA  
CN 1,2,3-Propanetricarboxylic acid, 2-hydroxy-, sodium salt (9CI) (CA INDEX NAME)



●x Na

L90 ANSWER 42 OF 54 HCA COPYRIGHT 2004 ACS on STN

95:171827 Conversion of alkali metal sulfate to the **carbonate**.

Sheth, Atul C. (United States Dept. of Energy, USA). U. S. Pat. Appl. US 80726 19800313, 18 pp. Avail. NTIS Order No. PAT-APPL-080 726.  
(English). CODEN: XAXXAV. APPLICATION: US 1979-80726 19791001.

AB A process is described for converting K<sub>2</sub>SO<sub>4</sub> to K<sub>2</sub>CO<sub>3</sub> in which a mixture of K<sub>2</sub>SO<sub>4</sub> and CaO are reacted at 700-800°, with a gaseous mixture having a minor amount of H<sub>2</sub> and/or CO in a diluent with the CaO being present in an amount <20 weight% of the K<sub>2</sub>SO<sub>4</sub> to produce an aqueous mixture of K<sub>2</sub>S, KHS, KOH, and CaS and a gaseous mixture of steam and H<sub>2</sub>S. The K and Ca salts are quenched to produce an aqueous slurry of soluble K salts and insol. Ca salts and a gaseous

mixture of steam and H<sub>2</sub>S. The Ca salts are separated from the solution. The Ca salts are dried to produce CaS, Ca bisulfide, and steam and the CaS and Ca bisulfide are converted to the oxide and recycled. The soluble K salts are **carbonated** to produce K<sub>2</sub>CO<sub>3</sub> which is concentrated and the precipitated crystals separated. The S-containing compds. are treated further, e.g., by the Claus process.

CC 48-8 (Unit Operations and Processes)  
Section cross-reference(s): **49**

ST potassium sulfate conversion **carbonate**; **sulfur recovery** MHD power plant

IT 7778-80-5, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)

(conversion of, to carbonate)

IT 584-08-7P

RL: PREP (Preparation)

(manufacture of, from potassium sulfate for MHD power plant)

IT 7704-34-9P, preparation

RL: PREP (Preparation)

(recovery of, from coal-fired MHD power plant)

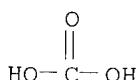
IT 584-08-7P

RL: PREP (Preparation)

(manufacture of, from potassium sulfate for MHD power plant)

RN 584-08-7 HCA

CN Carbonic acid, dipotassium salt (8CI, 9CI) (CA INDEX NAME)



## ● 2 K

IT 7704-34-9P, preparation

RL: PREP (Preparation)

(recovery of, from coal-fired MHD power plant)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

## S

L90 ANSWER 43 OF 54 HCA COPYRIGHT 2004 ACS on STN

95:120132 Aqueous **carbonate** process design study. McKisson, R. L.; Bauerle, G. L.; Bodine, J. E.; Rennick, R. D.; Stewart, A. E.; Tsang, S. (Energy Syst. Group, Rockwell Int. Corp., Canoga Park, CA, USA). Report, EPRI-CS-1574, 466 pp. Avail. NTIS From: Energy Res. Abstr. 1981, 6(4), Abstr. No. 4483 (English) 1980.

AB The process involves a spray dryer in which the flue gas is scrubbed and its S removed as a dry Na<sub>2</sub>SO<sub>3</sub>/Na<sub>2</sub>SO<sub>4</sub> plus Na<sub>2</sub>CO<sub>3</sub> mixture. This is followed by a regeneration process which involves the reduction of the SO<sub>3</sub><sup>2-</sup>/SO<sub>4</sub><sup>2-</sup> to S<sup>2-</sup> in a **molten** salt bed. This program involved studies of the **molten** salt reduction step and the conversion of an aqueous solution of the melt to a Na<sub>2</sub>CO<sub>3</sub> scrubbing solution. A process flow diagram and a material balance were developed based on coal-reduction process data. The reduction process was more difficult to operate with coal than with coke. The greater ash content of the coal is a major factor in determining the operating temperature of the reducer, with the result that the coal-reduction required a

bed temperature .apprx.55° higher than that for coke-reduction

CC 59-2 (Air Pollution and Industrial Hygiene)

Section cross-reference(s): 49, 60

IT Flue gases

(desulfurization of, regeneration of waste from, reduction by coal in **molten** salt bed in)

IT Coal

RL: OCCU (Occurrence)

(flue gas desulfurization waste reduction by, in salt bed, for

sulfur recovery and regeneration of scrubber solution)

IT Waste solids  
     (from flue gas desulfurization, reduction by coal in molten salt bath for sulfur recovery and regeneration of scrubber solution)

IT Salts, uses and miscellaneous  
     RL: USES (Uses)  
         (molten, coal in, flue gas desulfurization waste treatment by, for sulfur recovery and regeneration of scrubber solution)

IT 497-19-8, uses and miscellaneous  
     RL: USES (Uses)  
         (flue gas desulfurization scrubber solution containing, regeneration of)

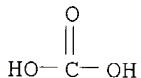
IT 7704-34-9P, preparation  
     RL: IMF (Industrial manufacture); PREP (Preparation)  
         (manufacture of, in reduction of sulfite-sulfate residue from desulfurization  
             scrubbing solution, coal in molten salt bath in)

IT 7757-82-6, reactions 7757-83-7  
     RL: RCT (Reactant); RACT (Reactant or reagent)  
         (reduction of, from spent desulfurization scrubber solution, coal in molten salt bed in)

IT 497-19-8, uses and miscellaneous  
     RL: USES (Uses)  
         (flue gas desulfurization scrubber solution containing, regeneration of)

RN 497-19-8 HCA

CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



●2 Na

IT 7704-34-9P, preparation  
     RL: IMF (Industrial manufacture); PREP (Preparation)  
         (manufacture of, in reduction of sulfite-sulfate residue from desulfurization  
             scrubbing solution, coal in molten salt bath in)

RN 7704-34-9 HCA

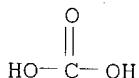
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 44 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 94:5538 Recovering calcium and sulfur compounds from a metallurgical waste material. Collin, Per Harald (Swed.). PCT Int. Appl. WO 8000831 19800501, 12 pp. (English). CODEN: PIXXD2.  
 APPLICATION: WO 1979-SE200 19791004.

AB Waste material containing CaO and CaS such as may be formed when S is removed from raw iron with lime or from preredn. of an iron ore with some grade of coal is treated. The CaO-CaS-containing waste is suspended in water for treatment with H<sub>2</sub>S until the partial pressure of H<sub>2</sub>S is 0.5-1.5 bar above the suspension and Ca(HS)<sub>2</sub> is in solution. After the insol. material is removed, the solution is treated with CO<sub>2</sub> at a rate that assures that the

gaseous product contains H<sub>2</sub>S with 10-30 volume% CO<sub>2</sub> and CaCO<sub>3</sub> is precipitated  
 IC C01F011-10; C01F011-18  
 CC 49-9 (Industrial Inorganic Chemicals)  
 ST iron ore preredn waste; hydrogen **sulfide recovery**;  
 calcium **carbonate recovery**  
 IT Wastes  
 (from iron ore preredn., calcium and **sulfur** compound  
**recovery** from)  
 IT Iron ores, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preredn. of, waste solids from, calcium and **sulfur** compound  
**recovery** from)  
 IT 471-34-1P, preparation  
 RL: PREP (Preparation)  
 (preparation of, from iron ore preredn. waste solids)  
 IT 7704-34-9P, preparation 7783-06-4P, preparation  
 RL: PREP (Preparation)  
 (recovery of, from iron ore preredn. waste solids)  
 IT 471-34-1P, preparation  
 RL: PREP (Preparation)  
 (preparation of, from iron ore preredn. waste solids)  
 RN 471-34-1 HCA  
 CN Carbonic acid calcium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



● Ca

IT 7704-34-9P, preparation  
 RL: PREP (Preparation)  
 (recovery of, from iron ore preredn. waste solids)  
 RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 45 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 93:243144 Rare anthropogenic and natural particles suspended in deep ocean  
 waters. Jedwab, Jacques (Lab. Geochim., Univ. Libre Bruxelles, Brussels,  
 B-1050, Belg.). Earth and Planetary Science Letters, 49(2), 551-64  
 (English) 1980. CODEN: EPSLA2. ISSN: 0012-821X.  
 AB Four hundred membrane filters from the Atlantic and Pacific deep waters  
 were scanned for colored and opaque particles by a method integrating the  
 light and the scanning electron microscopes, the electron microprobe and  
 the micro-x-ray diffraction camera. About 40 different types of particles  
 were found. A tentative classification of the particles and of their  
 morphol. and chemical varieties is presented, according to their  
 anthropogenic or natural origins. The particles fall into 5 groups: (1)  
 particle species exclusively produced by man's activities (brass, cobalt  
 aluminate); (2) particles exclusively produced by natural processes (like  
 amphibole, ilmenite); (3) particles rarely produced by natural processes,

but massively so by man (like metallic Cu, Cr<sub>2</sub>O<sub>3</sub>); (4) a large group of particles massively produced by nature and by man (like magnetite spherules, malachite); (5) a very small group of particles whose origin could not be attributed at present. Very few entirely new compds. from the point of view of continental mineralogy were encountered.

CC 53-5 (Mineralogical and Geological Chemistry)

IT **Carbonates**, occurrence  
 Silicates, occurrence  
 Sulfates, occurrence  
**Sulfides**, occurrence  
 RL: OCCU (Occurrence)  
 (suspended particles of, in deep waters, of Atlantic and Pacific oceans)

IT **Carbonates**, occurrence  
 RL: OCCU (Occurrence)  
 (hydrogen, suspended particles of, in deep waters, of Atlantic and Pacific oceans)

IT **7704-34-9P**, occurrence  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of)

IT 1309-38-2, occurrence 1310-14-1 1317-60-8, occurrence 1317-80-2  
 1317-92-6 **1319-53-5** 7429-90-5, occurrence 7439-89-6,  
 occurrence 7440-50-8, occurrence 12597-68-1, occurrence 12597-71-6,  
 occurrence 15860-78-3  
 RL: OCCU (Occurrence)  
 (suspended particles of, in deep waters, of Atlantic and Pacific oceans)

IT **7704-34-9P**, occurrence  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of)

RN 7704-34-9 HCA

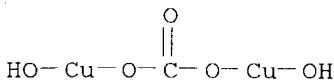
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **1319-53-5**  
 RL: OCCU (Occurrence)  
 (suspended particles of, in deep waters, of Atlantic and Pacific oceans)

RN 1319-53-5 HCA

CN Malachite (Cu<sub>2</sub>(CO<sub>3</sub>)(OH)<sub>2</sub>) (9CI) (CA INDEX NAME)



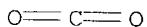
L90 ANSWER 46 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 89:45792 Treatment of an alkali metal sulfide solution. Rennick, Robert D.  
 (Rockwell International Corp., USA). Ger. Offen. DE 2741613  
**19780316**, 24 pp. (German). CODEN: GWXXBX. APPLICATION: DE  
 1977-2741613 19770915.

AB The solution is treated to recovery S. An alkaline solution with >60 mol % of an alkali metal sulfide is contacted in a neutralization zone with a H<sub>2</sub>S-containing gas to form a solution of reduced alkalinity containing a large amount of an

alkali metal bisulfide and a lesser amount of the **carbonate** or bicarbonates. The solution is then contacted with a gas containing a low concentration

of CO<sub>2</sub> to yield **carbonate** crystals free of sulfides and sulfites and a product gas high in H<sub>2</sub>S, 35-65% of which is used in the neutralization zone and the rest treated in a Claus facility to produce S. The **carbonate** product stream is decomposed thermally to yield a waste gas high in CO<sub>2</sub> and an aqueous slurry containing mainly **carbonates**. The CO<sub>2</sub> is used in the carbonating step.

IC C01B017-06  
 CC 49-1 (Industrial Inorganic Chemicals)  
 ST sulfide alkali metal decompn; **sulfur recovery**  
 IT 124-38-9, reactions  
     RL: RCT (Reactant); RACT (Reactant or reagent)  
       (reaction of, with alkali metal **sulfide**, in **sulfur recovery**)  
 IT 7704-34-9P, preparation  
     RL: PREP (Preparation)  
       (recovery of, from alkali metal sulfide solns., carbon dioxide in)  
 IT 7783-06-4D, alkali metal salts  
     RL: USES (Uses)  
       (**sulfur recovery** from, carbon dioxide in)  
 IT 124-38-9, reactions  
     RL: RCT (Reactant); RACT (Reactant or reagent)  
       (reaction of, with alkali metal **sulfide**, in **sulfur recovery**)  
 RN 124-38-9 HCA  
 CN Carbon dioxide (8CI, 9CI) (CA INDEX NAME)



IT 7704-34-9P, preparation  
 RL: PREP (Preparation)  
       (recovery of, from alkali metal sulfide solns., carbon dioxide in)  
 RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 47 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 87:41450 Removal of hydrogen sulfide from natural gas to obtain elemental sulfur. Kalymon, Ya. A.; Mel'nik, V. F.; Konovalenko, Z. L.; Pogonets, O. A.; Tomin, I. I. (USSR). Tezisy Dokl. Vses. Nauchno-Tekh. Konf. Tekhnol. Neorg. Veshchestv Miner. Udobr., 9th, Volume 1, 210-11. Editor(s): Amirova, S. A. Permsk. Politekh. Inst.: Perm, USSR. (Russian)  
 1974. CODEN: 34PSAU.

AB Optimum condition were discussed for removal of H<sub>2</sub>S from natural gas by chemisorption in a Na<sub>2</sub>CO<sub>3</sub> solution and preparation of elemental S by **oxidn** of H<sub>2</sub>S with organic catalysts dissolved in the Na<sub>2</sub>CO<sub>3</sub> solution  
 CC 51-4 (Fossil Fuels, Derivatives, and Related Products)  
 ST Section cross-reference(s): 49, 67  
     natural gas hydrogen sulfide removal; **sulfur** prepn hydrogen sulfide **oxidn**; catalyst hydrogen sulfide **oxidn**  
 IT Chemisorption

(of hydrogen sulfide in sodium **carbonate**, for sweetening of natural gas)

IT Oxidation catalysts  
 (soluble organic, for **recovery** of **sulfur** from sweetening of natural gas)

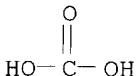
IT 497-19-8, uses and miscellaneous  
 RL: USES (Uses)  
 (in removal of hydrogen sulfide from natural gas and associated **sulfur recovery**)

IT 7704-34-9P, preparation  
 RL: PREP (Preparation)  
 (preparation of, removal of hydrogen sulfide from natural gas in relation to)

IT 497-19-8, uses and miscellaneous  
 RL: USES (Uses)  
 (in removal of hydrogen sulfide from natural gas and associated **sulfur recovery**)

RN 497-19-8 HCA

CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



## ●2 Na

IT 7704-34-9P, preparation  
 RL: PREP (Preparation)  
 (preparation of, removal of hydrogen sulfide from natural gas in relation to)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

## S

L90 ANSWER 48 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 86:142270 Study of reagent conditions for autoclave melting of sulfur. Tsap,  
 S. M.; Mel'nik, V. F. (USSR). Tezisy Dokl. Vses. Nauchno-Tekh. Konf.  
 Tekhnol. Neorg. Veshchestv Miner. Udobr., 9th, Volume 1, 203-4.  
 Editor(s): Amirova, S. A. Permsk. Politekh. Inst.: Perm, USSR. (Russian)  
**1974.** CODEN: 34PSAU.

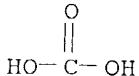
AB To optimize the melting of S, the relation between reagent conditions and composition and the properties of the concs. was investigated. The optimum consumption of Na<sub>2</sub>CO<sub>3</sub> corresponds to the amount necessary for binding Ca<sup>2+</sup> and Mg<sup>2+</sup> contained in the water added during melting. Na<sub>5</sub>P<sub>3</sub>O<sub>10</sub> consumption depends on the overall surface area of the barren rock. The efficiency of extracting S is decreased by sludge formation.

CC 49-1 (Industrial Inorganic Chemicals)

ST sulfur melting autoclave; sodium **carbonate** sulfur melting; triphosphate sulfur ore extn

IT 497-19-8, uses and miscellaneous 7758-29-4  
 RL: USES (Uses)  
 (in **sulfur recovery** from ore concs., by melting)

IT 7704-34-9P, preparation  
 RL: PREP (Preparation)  
 (recovery of, from ore concs. by melting, optimization of)  
 IT 497-19-8, uses and miscellaneous  
 RL: USES (Uses)  
 (in **sulfur recovery** from ore concs., by melting)  
 RN 497-19-8 HCA  
 CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



## ●2 Na

IT 7704-34-9P, preparation  
 RL: PREP (Preparation)  
 (recovery of, from ore concs. by melting, optimization of)  
 RN 7704-34-9 HCA  
 CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

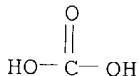
L90 ANSWER 49 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 83:47666 Recovery of **sulfur** dioxide. Shah, Indravadan S.  
 (Chemical Construction Corp., USA). Can. CA 949289 **19740618**, 13  
 pp. (English). CODEN: CAXXA4. APPLICATION: CA 1971-114866 19710604.  
 AB Waste gases containing SO<sub>2</sub> are scrubbed with a Na sulfite solution to form a Na  
 bisulfite solution, part of which is reacted with Ca and/or MgCO<sub>3</sub> to form a  
 precipitate which is heated, forming a recoverable S-containing product and  
 solid  
 particles of Mg and/or CaO. The remaining part of the bisulfite solution is  
 regenerated with Na<sub>2</sub>CO<sub>3</sub> and recycled for further waste gas scrubbing.  
 Thus, flue gas containing SO<sub>2</sub> 2000 ppm was delivered at 3010 m<sup>3</sup>/min and  
 scrubbed to remove apprx. 94% of the initial SO<sub>2</sub> content. After complete  
 processing S was recovered at a rate of 5.45 kg/min.  
 CC 59-2 (Air Pollution and Industrial Hygiene)  
 Section cross-reference(s): **49**  
 ST **sulfur recovery** waste gas  
 IT Flue gases  
 (sulfur dioxide removal from, by sodium bisulfite scrubber solution and  
 magnesium **carbonate**, **sulfur recovery** in)  
 IT 546-93-0  
 RL: OCCU (Occurrence)  
 (desulfurization scrubber solution treatment by, **sulfur**  
**recovery** in)  
 IT 7704-34-9P, preparation  
 RL: PREP (Preparation)  
 (recovery of, in **sulfur** dioxide removal from flue  
 gas by sodium bisulfite scrubber solution and magnesium **carbonate**  
 )  
 IT 7446-09-5, uses and miscellaneous  
 RL: REM (Removal or disposal); PROC (Process)

IT 7631-90-5  
 RL: OCCU (Occurrence)  
 (removal of, from flue gas by sodium bisulfite scrubber solution and magnesium carbonate, sulfur recovery in)

IT 546-93-0  
 RL: OCCU (Occurrence)  
 (desulfurization scrubber solution treatment by, sulfur recovery in)

RN 546-93-0 HCA

CN Carbonic acid, magnesium salt (1:1) (8CI, 9CI) (CA INDEX NAME)



## ● Mg

IT 7704-34-9P, preparation  
 RL: PREP (Preparation)  
 (recovery of, in sulfur dioxide removal from flue gas by sodium bisulfite scrubber solution and magnesium carbonate )

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 50 OF 54 HCA COPYRIGHT 2004 ACS on STN  
 80:99731 Chemistry of the molten carbonate process for sulfur oxides removal stack gases. Yosim, S. J.; Grantham, L. F.; McKenzie, D. E.; Stegmann, G. C. (At. Int. Div., Rockwell Int. Corp., Canoga Park, CA, USA). Advances in Chemistry Series, 127, 174-82 (English) 1973. CODEN: ADCSAJ. ISSN: 0065-2393.

AB In the molten carbonate process, a molten eutectic mixture of Li, Na, and K carbonates removes S oxides from power plant stack gases. The resulting molten solution of alkali metal sulfites, sulfates, and unreacted carbonate is regenerated in a 2-step process to the alkali carbonate for recycling. H<sub>2</sub>S, which is evolved in the regeneration step, is converted to S in a conventional Claus plant. A 10-MW pilot plant of the process has been constructed at the Consolidated Edison Arthur Kill Station on Staten Island, and startup is underway.

CC 59-2 (Air Pollution and Industrial Hygiene)

ST carbonate sulfur oxide removal; stack gas sulfur oxide removal

IT Carbonates, uses and miscellaneous

RL: USES (Uses)  
 (sulfur oxide removal by molten, from flue gas)

IT Flue gases  
 (sulfur oxide removal from, molten carbonates in)

IT 7704-34-9P, preparation  
 RL: PREP (Preparation)

(recovery of, in sulfur oxide removal from flue gas by molten carbonates)

IT 7446-09-5, uses and miscellaneous 7446-11-9, uses and miscellaneous  
RL: REM (Removal or disposal); PROC (Process)  
(removal of, from flue gas, molten **carbonates** in)

IT 497-19-8, uses and miscellaneous 554-13-2  
584-08-7  
RL: USES (Uses)  
(**sulfur** oxide removal by **molten**, from flue gas)

IT 7704-34-9P, preparation  
RL: PREP (Preparation)  
(recovery of, in sulfur oxide removal from flue gas by molten carbonates)

RN 7704-34-9 HCA

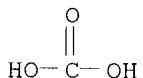
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 497-19-8, uses and miscellaneous 554-13-2  
584-08-7  
RL: USES (Uses)  
(**sulfur** oxide removal by **molten**, from flue gas)

RN 497-19-8 HCA

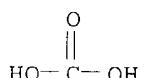
CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



## ●2 Na

RN 554-13-2 HCA

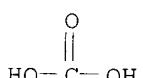
CN Carbonic acid, dilithium salt (8CI, 9CI) (CA INDEX NAME)



## ●2 Li

RN 584-08-7 HCA

CN Carbonic acid, dipotassium salt (8CI, 9CI) (CA INDEX NAME)



## ●2 K

L90 ANSWER 51 OF 54 HCA COPYRIGHT 2004 ACS on STN  
80:52188 Treating **liquid** waste containing **sulfur**.

Ninagawa, Hiroshi Jpn. Kokai Tokkyo Koho JP 48063967 **19730905**  
Showa, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1971-99728  
19711209.

AB The spent alkaline waste solution used to remove H<sub>2</sub>S was recovered. CO<sub>2</sub> was bubbled into the solution at a temperature above the decomposition temperature of alkali H

**carbonate** to react with alkali H sulfide or alkali sulfide. The H<sub>2</sub>S evolved with CO<sub>2</sub> was removed from the solution and was absorbed in a solution for recovery of elementary S.

NCL 13(7)A21

CC 60-2 (Sewage and Wastes)

IT **124-38-9**, uses and miscellaneous

RL: USES (Uses)

(hydrogen sulfide removal by, from desulfurizer scrubber solution, sulfur recovery in)

IT **7704-34-9P**, preparation

RL: PREP (Preparation)

(recovery of, from desulfurizer scrubber solution, carbon dioxide in)

IT **124-38-9**, uses and miscellaneous

RL: USES (Uses)

(hydrogen sulfide removal by, from desulfurizer scrubber solution, sulfur recovery in)

RN 124-38-9 HCA

CN Carbon dioxide (8CI, 9CI) (CA INDEX NAME)

O=C=O

IT **7704-34-9P**, preparation

RL: PREP (Preparation)

(recovery of, from desulfurizer scrubber solution, carbon dioxide in)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 52 OF 54 HCA COPYRIGHT 2004 ACS on STN

79:106507 **Sulfur** from Claus-process off-gases. Peter, Siegfried Ger. Offen. DE 2165646 **19730705**, 14 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1971-2165646 19711230.

AB H<sub>2</sub>S and SO<sub>2</sub> from the off-gases of the S separator of the 2nd catalyst step of the Claus-process were converted to S by washing at 120° with polyalkylene glycols or their ethers, e.g. triethylene glycol (I) or hexaethylene glycol monobutyl ether in the presence of alkanolamines, e.g. (HOCH<sub>2</sub>CH<sub>2</sub>)<sub>3</sub>N or [MeCH(OH)CH<sub>2</sub>]<sub>2</sub>NH (II), triethylenetetramine, or KHC<sub>3</sub>O as catalyst. Thus, a gas containing N 70, H<sub>2</sub>O(g) 25, H<sub>2</sub>S 3.5, and SO<sub>2</sub> 1.5 volume % was passed through a solution containing 8% II in I to give a gas containing 0.5 volume % H<sub>2</sub>S and traces SO<sub>2</sub>. The **liquid** S formed was drawn off the bottom and was of clear yellow color after solidification.

IC C01B

CC **49-1** (Industrial Inorganic Chemicals)

Section cross-reference(s): 59

ST    sulfur Claus process gas; hydrogen sulfide  
      sulfur; oxide sulfur hydrogen sulfide;  
      polyalkylene glycol gas washing; ether polyalkylene glycol washing;  
      alkanolamine catalyst sulfur; ethyleneamine catalyst  
      sulfur; amine catalyst sulfur; potassium  
      carbonate catalyst sulfur

IT    Catalysts and Catalysis  
      (amines and potassium carbonate, for hydrogen sulfide  
      -sulfur dioxide reaction)

IT    102-71-6, uses and miscellaneous 110-97-4 112-24-3 141-43-5, uses  
      and miscellaneous 298-14-6 622-40-2  
      RL: CAT (Catalyst use); USES (Uses)  
      (catalysts, in sulfur manufacture from Claus process gases)

IT    7704-34-9P, preparation  
      RL: PREP (Preparation)  
      (from hydrogen sulfide- and sulfur dioxide-containing  
      gases, by washing with polyalkylene glycols containing alkaline catalysts)

IT    112-27-6 112-60-7 1072-40-8 1191-91-9 4403-55-8 4792-15-8  
      25322-68-3 25322-69-4  
      RL: USES (Uses)  
      (in sulfur manufacture from Claus-process gases, washing with)

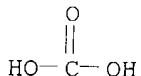
IT    7446-09-5, reactions  
      RL: RCT (Reactant); RACT (Reactant or reagent)  
      (with hydrogen sulfide, for sulfur manufacture from  
      Claus process gases)

IT    7783-06-4, reactions  
      RL: RCT (Reactant); RACT (Reactant or reagent)  
      (with sulfur dioxide, for sulfur manufacture from Claus  
      process gases)

IT    298-14-6  
      RL: CAT (Catalyst use); USES (Uses)  
      (catalysts, in sulfur manufacture from Claus process gases)

RN    298-14-6 HCA

CN    Carbonic acid, monopotassium salt (8CI, 9CI) (CA INDEX NAME)



● K

IT    7704-34-9P, preparation  
      RL: PREP (Preparation)  
      (from hydrogen sulfide- and sulfur dioxide-containing  
      gases, by washing with polyalkylene glycols containing alkaline catalysts)

RN    7704-34-9 HCA

CN    Sulfur (8CI, 9CI) (CA INDEX NAME)

S

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 74:143938 Converting soda slag from a blast furnace to useful products.

(Kloeckner-Humboldt-Deutz A.-G.). Ger. Offen. DE 1934308 **19710211**, 14 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1969-1934308 19690707.

AB A continuous flow process is described whereby obnoxious and poisonous H<sub>2</sub>O-soluble and easily decomposable constituents of a slag can be removed and converted to other products. Specifically, slag is ground with H<sub>2</sub>O. The solution which contains primarily Na<sub>2</sub>S is separated from the insol. portion and is treated with CO<sub>2</sub> at elevated temps. at a high pressure. H<sub>2</sub>S is liberated from the solution and NaHCO<sub>3</sub> is formed in solution. The H<sub>2</sub>S is oxidized to elemental S and NaHCO<sub>3</sub> isolated from the solution and converted to Na<sub>2</sub>CO<sub>3</sub> by calcination.

IC C01D; C01B; C21C

CC **49** (Industrial Inorganic Chemicals)

ST blast furnace sulfide slag conversion; **sulfur recovery**; sodium **carbonate** recycling

IT Slags  
(sodium sulfide removal from blast-furnace, for sodium **carbonate** and **sulfur recovery**)

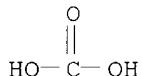
IT **497-19-8P**, preparation **7704-34-9P**, preparation  
RL: PREP (Preparation)  
(recovery of, from sodium **sulfide** from blast-furnace slags)

IT 1313-82-2  
RL: REM (Removal or disposal); PROC (Process)  
(removal of, from blast-furnace slags for recovery of sodium **carbonate** and sulfur)

IT **497-19-8P**, preparation **7704-34-9P**, preparation  
RL: PREP (Preparation)  
(recovery of, from sodium **sulfide** from blast-furnace slags)

RN 497-19-8 HCA

CN Carbonic acid disodium salt (8CI, 9CI) (CA INDEX NAME)



●2 Na

RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

L90 ANSWER 54 OF 54 HCA COPYRIGHT 2004 ACS on STN  
74:55749 Carbon oxide regenerant for **sulfur** recovery from molten salts. Grantham, Le Roy F. (North American Rockwell Corp.). U.S. US 3551108 **19701229**, 8 pp. Division of U.S. 3,438,734 (English). CODEN: USXXAM. APPLICATION: US 1968-779175 19681126.

AB A method is described for direct recovery of elemental S from the molten salt mixture used for desulfurizing flue gases according to the process of U.S. 3,438,734. The molten salt mixture containing

alkali metal sulfites is treated at 400-50° with H and (or) CO to reduce partially the sulfites to **sulfides**. The melt is then treated with CO<sub>2</sub> whereby elemental S vapor and a melt of alkali metal **carbonates** are formed. The **molten carbonates** are recycled to the flue gas desulfurization step and the S is condensed from the vapor as product. The method avoids formation of **H<sub>2</sub>S** as an intermediate requiring conversion to S.

IC C01D; C01B  
NCL 023224000  
CC 49 (Industrial Inorganic Chemicals)  
ST **sulfur** recovery; flue gases desulfurizing; gases flue desulfurizing; desulfurizing flue gases  
IT 7704-34-9P, preparation  
RL: PREP (Preparation)  
(recovery of, from alkali metal sulfites by reduction with carbon oxides and hydrogen)  
IT 124-38-9, reactions 630-08-0, reactions 1333-74-0, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reduction by, of alkali metal sulfites for **sulfur** recovery)  
IT 7704-34-9P, preparation  
RL: PREP (Preparation)  
(recovery of, from alkali metal sulfites by reduction with carbon oxides and hydrogen)  
RN 7704-34-9 HCA  
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT 124-38-9, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reduction by, of alkali metal sulfites for **sulfur** recovery)  
RN 124-38-9 HCA  
CN Carbon dioxide (8CI, 9CI) (CA INDEX NAME)

O= C= O

=&gt;